





S Y L L A B U S.

Pointing out every Part of the

HUMAN SYSTEM.

Likewise the different Positions of the

CHILD in the *WOMB*, &c.

As they are exactly and accurately shewn

IN THE

Anatomical WAX-FIGURES,

OF THE LATE

Monfieur *D E N O U È*.

To which is added,

A COMPENDIUM of ANATOMY,

DESCRIBING THE

Figure, Situation, Connexion, and Uses

Of all the PARTS of the

HUMAN BODY.

By G. THOMSON, M. D.

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AN EXPLANATION

Of the General Terms used in ANATOMY.

FIBRE is a fine simple small part like a hair.

ARTERY is a canal, which conveys the blood from the heart to all parts of the body. See fig. 13. in the Chest of Cases A E K.

VEIN is a canal, which returns the blood from all parts of the body to the heart. See fig. 3, 4. in the Chest of Cases A E K.

NERVE is a whitish round part like a cord, extended from the brain and spinal marrow to all parts of the body, being subservient to sense, motion, and nutrition. See H in Case I.

MEMBRANE is a part expanded like linnen or paper, which serves to cover and wrap up the parts. See Λ Ω in the belly of Case B.

COAT is the same with a membrane.

LIGAMENT is that which serves firmly to unite together other parts of the body, especially the bones. See fig. 79. in the foot of Case B. 83 in the foot of Case W, Δ between the fore-arm bones, and θ between the bones of the leg in Case E.

MUSCLE is any red fleshy part of the body, and the instrument of motion. See fig. 14, 15, 16. in the thigh of Case E.

TENDON is that white part which forms the extremity of a muscle. See fig. 66, 70, 75. in the foot of Case B.

APONEUROSIS is any tendinous part expanded like a membrane. See W in the belly of Cases B and F.

LYMPHATIC VESSEL is a small canal, that returns like a vein from many parts a thin and almost watery liquid to the heart. See the liver, spleen, and bladder in Case A.

LACTEAL VESSEL is a small canal like the former, situate in the intestines and mesentery, that receives from the intestines the chyle, and conveys it along the mesentery to the receptacle of the chyle. See the white vessels in fig. 15, 16. in the belly of Case A.

CHYLE is a fluid of a milky colour arising from the digested aliments.

EXCRETORY DUCT is a canal which receives a liquid secreted in certain glands and other viscera, and discharges it into proper places. See fig. 34, 35. in the parts of generation in Case E.

BONE is the hardest part of the body, white, void of sense, and framed for the support and defence of the soft parts, smooth, polished, pliable, and elastic.

CARTILAGE is a whitish or pearl-colour'd substance, softer than a bone, but harder than any other part. See X in the breast bones of Cases B C and X.

GLAND

EXPLANATION, &c.

GLAND is a part of a peculiar make, distinguishable from all other parts of the body, by its form, consistence, texture, and connexion. It properly consists of blood-vessels, nerves, and for the most part of an excretory duct. See 12, 7. in the belly of Cases C E and X.

VESSEL is a tube, duct, or canal, more or less flexible; composed of different membranes. See 34 and 32 in the parts of generation of Cases A and E.

FAT is an oily, soft, white, or yellow substance, of different consistences, collected between the skin and the muscles.

MARROW differs from fat only in the fineness of the membranous texture; in the subtilty of the oily matter, and in its situation within the bones.

VISCERA are those parts contained in a great cavity, without being connected to it thro' their whole extent, as the stomach, intestines, &c. in the belly; and the lungs in the chest.

ORGAN is a term given to every part capable of any office, whether it be simple or compound, and in this sense we speak of the organ of hearing, seeing, &c.



ADVERTISEMENT.

For Inspecting the following Figures:

EACH large figure in every Case is generally divided into the following parts, viz. the BONES, CONTENTS of the BELLY, CHEST, NECK, BRAIN, and EXTERNAL MUSCLES (marked red) and these again subdivided into muscles of the head; neck; &c.

The figure on the left side of each column answers to that fixed on the wax figures; and the figure on the right side of each column refers you to the page of the Book, where you will find the situation, connexion, and use of that part.

N. B. In such a laborious undertaking; the reader may find some parts marked wrong, others not taken notice of, the author therefore would be greatly obliged to him, if he would take the trouble of marking those upon a slip of paper, and leaving it with the person who takes care of the figures.

C A S E A.

In which is a man at full length, where most of the external muscles are demonstrated ; likewise the parts contained within the skull, chest, and belly, are so disposed, as to be easily removed, for seeing more conveniently those parts that lie under them, especially the ventricles of the brain, origin and egress of the nerves, thoracic duct, lymphatic and lacteal vessels, urinary parts, parts of generation, &c.

The BONES.

Z The skull, covered with a membrane, called pericranium, Page 2

B The collar-bone 9

b The broad prominence of the shoulder-bone 9

d The head of the arm-bone 10

G The haunch-bone 8

I The share-bone 8

M The shin, or great bone of the leg 12

A The adipose membrane or fat covering of the body 14

The MUSCLES and CONTENTS of the BELLY.

*1 The external oblique descending muscles 15

*2 The internal oblique ascending muscles 15

*5 The transverse muscles 16

I The stomach ; the upper part represents the second, or fleshy coat, and the lower, the first or common coat, beautifully adorned with blood and lymphatic vessels 17

2 Its left orifice or opening, joining the gullet 18

3 Pylorus, or lower or right orifice of the stomach, joining the duodenum or first small gut 18

4 The liver, p. 20. on which are small white vessels called lymphatics 23

5 The gall-bladder 21

6 The cystic duct, or a canal which comes from the gall-bladder 21

7 The hepatic duct, or a canal from the liver 21

8 The common gall-duct, made by the union of the two former 21

9 The round ligament or band of the liver 20

10 Vena portæ 20, 121

11 An artery from the celiac branch 111

12 The spleen or melt, 22. on which

are small white canals called lymphatics Page 23

13 The splenic artery 111

14 The splenic vein 121

15 Part of the small guts, 18. joined with part of the mesentery, 20. on which are several red spots called the mesenteric glands, 22. likewise a fine representation of white vessels, called the lacteals, 22. with veins and arteries.

β The receptacle or reservoir of the chyle 21

17 Rectum, or straight gut, 19. whose extremity, called anus, is surrounded with a muscle, termed the sphincter 19

18 Levator, or another muscle of the anus 19

19 Aorta or great artery 108

O The external iliac arteries 113

P The internal iliac arteries 113

20 Vena cava, or great vein 116
119, 120

Q Veins belonging to the midriff 119

R The three large branches of veins spread thro' the liver 119

S The external iliac veins 120

21 Arteries that go to the kidneys, called emulgents 111

22 Veins that go to the kidneys, termed emulgents 120

23 The right kidney 23

24 The left kidney, in which is a fine representation of that cavity, called the bason 24

25 The two renal glands or deputy-kidnies 26. with their blood-vessels a b 25, 112, 120

26 The Ureters or urinary canals 24

27 The bladder, with its first coat, 24

28 The spermatic or seed arteries 26, 112

29 The spermatic veins 26, 120

30 The left testicle, with its coat 25

31 Its muscle, called cremaster	25	Φ Oesophagus or gullet	17
32 The right testicle laid bare to shew its vessels	25	Γ The thoracic duct or canal	23
33 Epididymis, or a small appendix belonging to the testicles	26	X The intercostal nerve	129
34 The ejaculatory vessels	26	The CONTENTS of the NECK, &c.	
35 The seminal vessels	26	23 The wind-pipe	57
36 Penis, or yard, cut a-cross to shew its spongy substance	27	24 The thyroid gland	58
37 Its vein and artery	113, 120	25 The larynx or upper part of the wind-pipe	57
38 Erectores, or first pair of muscles of the yard	27	g The tongue-bone	5, 91
39 Acceleratores, or second pair of muscles of the yard	28	26 The external jugular veins	117
N.B. <i>The stomach must be raised before all the parts marked here can be seen.</i>		27, 28 The two divisions of the external jugular veins	117
The CONTENTS of the CHEST.		29 The internal jugular veins	117
1 The diaphragm or midriff	45	30 Veins from the subclavians that go to the wind-pipe	117
2 The heart	47	31 The carotide arteries	108
3 The ascending or inferior cava or great vein	48, 119	Two Muscles of the Larynx.	
4 The descending or superior cava	48, 116	32 Crico-thyreoidæus	58
5 The right auricle of the heart	48	33 Hyo-thyreoidæus	58
6 The right ventricle	47	34 Genio-hyoidæus, a pair of muscles of the tongue-bone	91
7 The pulmonary artery, or that vessel which goes to the lungs	48, 107	35 Digastricus, a muscle of the lower jaw	101
8 The lungs	53	36 Stylo-hyoidæus, a muscle of the tongue-bone	91
9 The pulmonary artery entering both lobes of the lungs, with a fine representation of the branches in the left lobe	54, 107	37 The maxillary gland	90
10 A curious sight of the branches of the pulmonary vein in the left lobe of the lungs, 116. with its entrance into		38 Its canal entering the tongue	90
11 The left auricle of the heart	49	39 The parotide gland	90
12 Aorta or great artery rising out of		40 Its canal entering the mouth thro' the buccinator muscle	90
13 The left ventricle of the heart	48, 108	The EYE.	
4 The origin of the right subclavian vein	117	1 Marked red is the orbicularis, or muscle of the eye-lids	71
16 The origin of the right and left carotide arteries	108, 109	1 Marked black the eye	70
17 The origin of the left subclavian artery	109	2 The lachrymal canal	71
18 The great descending artery	111	3 The lachrymal gland in both sides	71
19 The coronary veins upon the heart	49	The four straight Muscles of the Eye.	
20 The azygic vein	116	4 Attollens	72
21 The subclavian veins	117	5 Deprimens	72
22 The right branch of the wind-pipe entering the right lobe of the lungs	53, 57	6 Adductor	72
		7 Abductor	72
		The two oblique Muscles of the Eye.	
		8 Obliquus major	72
		9 Obliquus minor	72
		X Sclerotica, or the first coat of the eye	72
		1 Adnata, or the white coat of the eye	72
		The BRAIN.	
		One half of the brain cut off to shew the ventricles	65
		1 The left lobe of the brain	65
		X The cortical or external substance of the brain	65

m	The medullary or inner substance of the brain	65
z	Corpus callosum, or the covering of the two lateral ventricles	65
3	Corpora striata, or the striated bodies	66
4	Thalami nervorum opticorum, or the beds of the optic or second pair of nerves	66
a	The lateral ventricles	65

Turn round the brain.

6	The four lobes of the cerebrum, or fore-part of the brain	65
7	One half of the cerebellum, or hind-part of the brain	67
8	The first pair of nerves	125
9	The second pair of nerves	125
10	The third ventricle	67
11	The annular process	68, 69
12	Corpora pyramidalia, or the pyramidal bodies	69
13	The beginning of the spinal marrow	69

THE BASE OF THE SKULL.

In which you have a fine sight of the ten pair of nerves going out of the skull, of the pituitary gland, of the sinuses or canals of the dura mater.

1	The first pair of nerves	69, 125
2	The second ditto	69, 125
3	The third ditto	69, 125
4	The fourth ditto	69, 126
5	The fifth ditto	69, 126
6	The sixth ditto	69, 127
7	The seventh ditto	69, 127
8	The eighth ditto	69, 128
9	The ninth ditto	69, 129
10	The tenth ditto	69, 129
11	Willis's accessory pair of nerves	68
12	The spinal marrow	69
13	The pituitary gland	67
14	The lateral, or second and third canals of the dura mater	63
15	Torcular, or meeting of the four canals	63
16	The fourth sinus, or canal of the dura mater	63

THE VEINS ON THE ARMS, &c.

1	The axillary veins	118
X	The axillary gland	
2	The cephalic veins	118
3	The basilic veins	118
7	The internal cephalic vein	118

4	The median vein	118
5	The external cephalic vein	118
6	The external basilic vein	118
	The Veins on the left Thigh.	
7	The crural vein	
8	The saphæna	

The following parts, marked with RED FIGURES, are some of the muscles not yet mentioned.

Muscle of the Eye-lids.

1	Orbicularis	71
	Muscles of the Lips.	
2	Elevator labij superioris	100
3	Elevator labij inferioris	100
4	Elevator labiorum communis	100
6	Depressor labiorum communis	100
7	Sphincter labiorum	100
8	Depressor labij inferioris	100
5	Masseter, a muscle of the lower jaw	101

See the backside of the head.

Muscles of the Head.

9	Rectus major posticus	101
10	Obliquus superior	101
11	Obliquus inferior	101
13	Mastoidæus lateralis	101

Muscles of the Neck.

12	Transversalis	101
14	Scalenus	101

Muscles of the Arm-bone.

15	Deltoides	103
16	Pectoralis major	103

Muscles of the Fore-arm.

17	Biceps	103
18	Brachizæus internus	103
19	Longus	104
20	Brevis	104
21	Brachizæus externus	104
22	Anconæus	104

Muscles of the Radius, or second bone of the Fore-arm.

23	Rotundus	104
24	Supinator longus	104

Muscles of the Wrist.

25	Flexor carpi radialis	104
26	Extensor carpi radialis	104
27	Extensor carpi ulnaris	104

Muscles of the Fingers.

28	Extensor digitorum communis	104
29	Perforans	104
30	Perforatus	104
31	Interossei externi	104

Muscles

Muscles of the Thumb.		50 Semimembranosus	105
32	Extensor primi	51 Biceps	105
33	Extensor secundi	Muscles of the Foot.	
34	Extensor tertij	52 Gastrocnemius externus	106.
35	Abductor	53 Gastrocnemius internus	106
36	Adductor	54 Tendo Achillis, or the strong tendon of the two former muscles	106
Muscle of the Fore-finger.		55 Tibialis anticus	106
37	Extensor	56 Peronæus anticus	106
Muscle of the Little-finger.		57 Tibialis posticus	106
38	Abductor	58 Peronæus posticus	106
39	The annular ligament which serves to compress, or keep together the subjacent muscles and bones of the wrist.		
Muscles of the Thigh.		Muscles of the Lesser-toes.	
40	Psoas magnus	59 Extensor longus	106
41	Pectinæus,	60 Extensor brevis	106
42	Glutæus maximus	61 Interossei externi	106
		62 Perforans	106
		Muscle of the Great-toe.	
43	Membranofus	63 Extensor longus	106
44	Sartorius	64 Extensor brevis	106
45	Rectus	65 Abductor	106
		Muscle of the Little-toe.	
46	Vastus externus	66 Abductor minimi digiti	107
47	Vastus internus	67 The annular ligament which serves to compress, or keep together the subjacent muscles and bones.	
48	Gracilis		
49	Seminervofus		

C A S E B.

In which is a man in full proportion, whose brain is cut a-cross and raised from the base of the skull to shew the lateral ventricles, pineal gland, plexus choroides, falx, origin of the nerves, and their exit out of the skull. The sternum, or breast-bone is raised, and the belly open'd, for exhibiting to view the situation of the lungs, heart, peritonæum, cawl, intestines, &c. On the left side most of the internal and some of the external muscles are demonstrated; and on the left, the arteries of the breast, arm, hand, thigh, leg, and foot.

The BONES.			g g g g g } The bones of the fingers	
1 2 3 4 5 6 7	The seven true ribs		8 h h h h h }	and thumb 10
1 2 3 4 5	The five false ribs		8 i i i i i }	
A	The breast-bone		9 G	The haunch-bone 8
X	Its cartilage or gristle		9 k	Its ridge 8
B	The collar-bone		9 H	The hip-bone 8
C	The shoulder blade-bone		9 I	The share-bone 8
a	Its sharp prominence		9 K	The thigh-bone 11
b	Its broad prominence		9 m	} The greater and lesser protuberances at the head of the thigh-bone 11
c	Its spine or ridge		9 n	
D	The arm-bone		10 p p	Its lower protuberances 11
d	Its head		10 L	The knee-pan 11
E	The spoke-like bone of the forearm		10 M	The great bone of the leg 12
F	The cubit, or ell-bone of the forearm		10 q	Its lower protuberance making the inner ancle 12
f f f f	The four bones of the back of the head		10 N	The small bone of the leg 12
				r Its

r	Its inferior part making the outer angle	12	26	Sphincter, or a muscle furrounding the extremity of the last great gut	19
1 2 3 4 5 6 7	The seven bones of the instep	12	27	Levators, or the second pair of muscles of the straight gut	19
s s s s s	The five bones that make the upper-part of the foot	12	The CONTENTS of the CHEST.		
t t t t }	The bones of the toes	12	1	Diaphragm, or midriff	45
v v v v v }			2	Pericardium, or heart-purse	46
x x x x }			3	The heart	47
			4	The lungs	53
A	The adipose membrane or fat covering	14	5	A gland called thymus	46
The MUSCLES and CONTENTS of the BELLY.			6	Mediastinum, or a partition dividing the chest lengthways into two parts	46
*1	The external oblique descending muscles	15	The CONTENTS of the NECK, with some parts of the FACE.		
*2	The internal oblique ascending muscles	15	1	The wind-pipe	57
*3	The pyramidal muscles	15	2	The thyroid gland	58
*4	The straight muscles	16	3	Larynx, or upper part of the wind-pipe	57
*5	The transverse muscles	16	g	The tongue-bone	5, 91
A	Peritonæum	16	Muscles of the Tongue-bone.		
Ω	The cawl	16	5	Sterno-hyoidæus	91
3	The liver	20	8	Coraco-hyoidæus	91
4	The gall-bladder	21	12	Genio-hyoidæus	91
5	The round ligament, or band of the liver	20	14	Mylo-hyoidæus	91
7	Urachus	24	6	Sterno-thyreoidæus, or a muscle of the larynx	58
aa	The umbilical arteries 24, 25, 113		7	Mastoidæus, or a muscle of the head	105
8	The guts	18, 19	13	Digastricus, or a muscle of the lower jaw	101
9, 10	A rupture in the right and left side.		15	The maxillary gland	90
11	The right testicle, with one of its coats separated	253	16	The subclavian artery	109
12	Its muscle called cremaster	25	17	The carotide artery	108
13	The spermatic vessels 26, 112, 120. inclosed in their coat	25	18	The subclavian vein	117
14	The left testicle with its blood-vessels	25	19	The internal jugular vein	117
15	Its muscle termed cremaster	25	20	The external jugular veins	117
16	The yard laid bare	27	21	An artery on the edge of the lower jaw	108
18	The ligament or band	27	22	The parotide gland	90
19	Its vein	27, 120	23	Its canal passing through the buccinator muscle to the mouth	90
20	The yard cut a-crofs to shew its substance	27	24	A protuberance on the cheek-bone.	
21	Erectores, or first pair of muscles of the yard	27	25	The external cartilage, or gristle of the nose	94
22	Acceleratores, or second pair of muscles of the yard	28	The EYE.		
23	Epididymis, or a protuberance of the testicle		1	The globe of the eye	71
24	The inner coat of the right testicle	25	2	The lachrymal canals	71
25	The testicle cut a-crofs to shew its substance	25	3	The lachrymal gland	71
			Muscles of the Eye.		
			3	Orbicularis, marked red	72
			4	Attollens	72
			5	Deprimens	72
			6	Ad-	

6 Adductor	72	15 Poplitæa, or that artery which runs under the ham	113
7 Abductor	72	16 The external artery of the leg	113
8 Obliquus major	72	17 The internal artery of the leg	113
9 Obliquus minor	72	18 Several branches spread upon the feet and toes	115
The BRAIN.		The following Parts, marked with RED FIGURES, are some Muscles not yet mentioned.	
1 Falx, or first process of the dura mater	62	Muscle of the Face.	
2 The longitudinal sinus, or first canal of the dura mater	62	1 Corrugator	
3, 4 The lateral sinuses, or the second and third canals	62	Muscles of the Nose.	
5 The fourth canal	63	2 Elevator nasi	100
6 Torcular, or union of the four former canals	63	3 Dilatator	100
8 The inferior longitudinal sinus, or the eleventh canal	63	4 Depressor	100
9 The pineal gland	67	Muscle of the Eye-lids.	
10 Plexus choroides, or a layer of blood-vessels	66	5 Orbicularis	71
11 Cerebellum, or the hind-part of the brain	68	Muscles of the Lips.	
12 The medullary, or internal substance of the brain	65	6 7 Elevator labij superioris	100
13 The cortical, or external substance of the brain	65	8 Elevator labij inferioris	100
14 Corpora striata, or the striated bodies	66	9 Elevator labiorum communis	100
15 Thalami nervorum opticom, or the beds of the optic nerves	66	10 Depressor labiorum communis	100
16 The four lobes of the brain	65	11 Depressor labij inferioris	100
The brain is here a little raised from the base of the skull, to shew how the nerves rise out of the brain, and pass thro' the several holes of the skull, already described in Cases AEFKNP.		12 Sphincter labiorum	100
The Arteries and Veins on the Right-Side.		Muscles of the Cheeks.	
1 The mammary artery, or that spent upon the breast	109	13 Buccinator	100
2 The axillary vein, or that under the arm-pit, with its internal branches	118	15 Quadratus genæ	100
3 The basilic vein	118, 119	Muscle of the lower Jaw.	
4 5 6 Arteries spread upon the shoulder, breast, and under the arm	109, 110	14 Masseter	101
7 The axillary artery	110	Muscles of the Head.	
8 The brachial artery	110	16 Rectus major posticus	101
9 10 11 Several branches of the axillary artery	110	17 Obliquus superior	101
The Arteries and Veins of the Thigh and Leg.		18 Complexus	101
12 The crural vein	121	19 Splenius	101
13 14 The crural artery	113	20 Mastoideus lateralis	101
		Muscle of the Neck.	
		21 Scalenus	101
		Muscles of the Chest.	
		23 Subclavius	102
		24 Intercostales	102
		25 Serratus major anticus	102
		Muscles of the Shoulder-blade.	
		22 Trapezius	103
		Muscles of the Arm-Bone.	
		26 Deltoides	103
		27 Pectoralis major	103
		28 Latissimus dorsi	103
		Muscles of the Fore Arm.	
		29 Biceps	103
		30 Brachialis internus	103
		31 Longus	104
		32 Brevis	104

33	Brachiaëus externus	104	57	Vastus internus	106
34	Anconæus	104	58	Cruræus	106
Muscles of the Radius, or second Bone of the Fore-arm.			59	Gracilis	105
35	Rotundus	104	60	Seminervofus	105
36	Quadratus	104	61	Semimembranofus	105
37	Supinator longus	104	62	Biceps	105
38	Supinator brevis	104	Muscles of the Foot.		
Muscles of the Wrist.			63	Gastrocnemius externus	106
39	Extensor carpi ulnaris	104	64	Gastrocnemius internus	106
40	Extensor carpi radialis	104	65	Tendo Achillis, or the strong tendon of the two former muscles	106
41	Flexor carpi ulnaris	104	66	Tibialis anticus	106
Muscles of the Fingers.			67	Peronæus anticus	106
42	Extensor digitorum communis	104	68	Tibialis posticus	106
43	Perforans	104	69	Peronæus posticus	106
Muscles of the Thumb.			Muscles of the Toes.		
44	Extensor primi internodij	105	70	Extensor longus	106
45	Extensor fecundi internodij	105	71	Extensor brevis	106
46	Adductor	105	72	Interoflei externi	106
Muscles of the Fore-finger.			73	Perforans	106
47	Extensor	105	74	Perforatus	106
48	Adductor	105	Muscles of the Great Toe.		
Muscle of the Little-finger.			75	Extensor longus	106
49	Abductor	105	76	Extensor brevis	106
Muscles of the Thigh.			77	Abductor	106
50	Pectinæus	105	Muscle of the Little-Toe.		
51	Glutæus maximus	105	78	Abductor minimi digiti	106
52	Iliacus externus	105	79	The annular ligament, which serves to compress and keep together the subjacent muscles and bones.	
Muscles of the Leg.					
53	Membranofus	105			
54	Sartorius	106			
55	Rectus	106			
56	Vastus externus	106			

C A S E C.

In which is the figure of a man, exhibiting to view on the left side a general system of angiology, or the blood-vessels, viz. the distribution of all the arteries thro' the substance of the brain; the distribution of the arteries and veins on the several parts of the head, neck, shoulder, breast, the muscles of the arm, fore-arm, hand, fingers, and heart, thro' the substance of the lungs, liver, and spleen, upon the stomach, gall-bladder, mesentery, intestines, and bladder of urine, with those belonging to the parts of generation. This distribution is continued along the thigh, leg, foot, and toes. You have here also the branches of the vena portæ, the biliary and pancreatic ducts or canals. The right side is a fine natural articulated skeleton. The intestines lie under this figure.

The BONES.

Z	The skull	2	a	Its sharp process	9
1 2 3 4 5 6 7	The seven true ribs	8	b	Its broad process	9
1 2 3 4 5	The five false ribs	8	c	Its spine or ridge	9
A	The breast-bone	9	D	The arm-bone	10
X	Its cartilage	9	d	Its head	10
B	The collar-bone	9	e	Its lower extremity	10
C	The shoulder blade-bone	9	E	Radius, or lesser bone of the fore-arm	10
			F	The	

F The cubit, or greater bone of the fore-arm	10	7 The bile canals in the liver	20, 21
1 2 3 4 5 6 7 8 The eight bones of the wrist	10	8 The hepatic duct	21
ffff The four bones of the back of the hand	10	9 The gall-bladder	21
g g g g g } The bones of the fingers		10 Its canal called the cystic duct	21
h h h h h } and thumb	10	11 The common bile duct, or canal made by the union of the hepatic and cystic canals	21
i i i i i }		12 Pancreas or sweet-bread	21
G The haunch-bone	8	13 Its canal called the pancreatic duct	21
k Its spine or ridge	8	15 Duodenum, or first small gut	18, 21
H The hip-bone	8	16 Jejunum and ilium, or the second and third small guts	19
I The share-bone	8	17 Cæcum, or first great gut	19
K The thigh-bone	11	18 Colon, or second great gut	19
l Its round head received into its cavity	11	19 Rectum, or last great gut	19
m n Its greater and lesser protuberances	11	C Anus, or extremity of the great gut	19
o Its neck	11	D Its muscle called the sphincter	19
p p Its two lower protuberances	11	E Its other pair of muscles termed the levators	19
L The knee-pan	11	20 The substance of the spleen or melt	21
M The shin, or great bone of the leg	12	21 The splenic artery	21, 111
q Its lower process making the inner angle	12	22 The splenic vein	21, 121
N The lesser bone of the leg	12	23 The mesenteric vein	121
r Its inferior protuberance making the outer angle	12	24 Aorta, or the great artery	48, 108, 111
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s s s s s The five bones of the upper part of the foot	12	26 The superior mesenteric artery	111
t t t t t } The bones of the toes	12	27 The emulgent arteries	24, 111
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x x x x }		29 The internal iliac arteries	113
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*2 The oblique ascending muscles	15	32 The emulgent veins	24, 120
*3 The pyramidal muscles	15	33 The external iliac veins	120
*4 The straight muscles	16	34 The deputy kidneys or renal glands	25
1 The stomach	17	35 The kidneys	23
2 Its upper orifice joined to the gullet	18	36 Ureters, or urinary canals	24
3 Pylorus, or lower orifice united with the first gut	18	37 The bladder	24
X Its arteries and veins called the coronary vessels	111, 121	38 The spermatic veins and arteries in the right side inclosed in their coat	26
4 The three large veins that go from the vena cava to the liver	20, 119	39 The vaginal or external coat of the feminal vessels and testicles	25
5 The several branches of the vena portæ in the liver	20, 121	40 The testicle	25
6 The arteries in the liver	111	41 Its protuberance called epididymus	26
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		43 The	

- 43 The yard, having the skin taken off to shew its blood-vessels and nerves 27, 38, 113, 120, 132

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2 The heart 47
3 Its right auricle 48
4 Its right ventricle 47
5 The pulmonary artery 48, 107
8 The lungs 53
7 That branch of the pulmonary artery which enters the right lobe of the lungs 48, 107
8 A beautiful view of the several branches of the pulmonary artery in the left lobe of the lungs 107
9 The branches of the pulmonary vein in the left lobe of the lungs, 49, 116. likewise its entrance into

- 10 The left auricle of the heart 49
11 The left ventricle of the heart 47
12 Aorta, or great artery rising out of the heart 48, 108
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- 14 The wind-pipe 57
15 The thyroid gland 58
16 Larynx or upper part of the wind-pipe 57
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- 17 Crico-thyreoidæus 58
18 Hyo-thyreoidæus 58
19 Stylo-hyoidæus, a muscle of the tongue-bone 91
The Muscles of the Tongue.

- 20 Stylo-glossus 93
22 Genio-glossus 93
33 Cerato-glossus 93
21 Digastricus, a muscle of the lower jaw 101

- 37 The maxillary gland, with X its canals entering the tongue 90

- 25 The subclavian arteries 109
26 The carotide arteries 108, 109

- 27 The vertebral or cervical arteries 109

- 28 The subclavian veins 117

- 29 The external jugular veins 117

- 30 Veins from the subclavians that go to the wind-pipe 117

- 31 The internal jugular veins 117

- 32 Thyreo-pharyngæus, a muscle of the pharynx, or upper part of the gullet 101

- 33, 34 Veins that go to the muscles of the lower-jaw and tongue 117

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- 2 The lachrymal gland 71

The Muscles of the Eye-lids.

- 3 Musculus rectus 70

- 4 Orbicularis (marked red) 71

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- 5 Deprimens 72

- 6 Adductor 72

- 7 Abductor 72

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- 9 Obliquus minor 72

- 10 The entrance to the lachrymal bag, 71. to see which, with the origin and insertion of the muscles of the eye, raise the right eye.

- 10 The external cartilage of the nose 94

- aa The cutting-teeth. 5

- b The dog, or eye-teeth 5

- c c c c The grinders 5

- 11 The palate 92

- 12 The tongue 89

- 13 Uvula 92

- 14 The tonsils, or almond glands 92

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- 1 The second process of the dura mater 62

- 2 The lateral sinuses, or second and third canals of the dura mater 62

- 3 The first pair of nerves 69, 125

- 4 The second ditto 69, 125

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- 6 The sixth ditto 69, 127

- 7 A branch from the sixth pair, that assists in giving origin to the intercostal nerve 69, 127

- 8 The carotide arteries 69, 109

- 9 The cervical artery 69, 109

- b 11 The

11 The communicant arteries 69, 109		Muscles of the Head.	
The Blood-Vessels of the Left Breast,		12 Rectus minor posticus	101
Shoulder, and Arm.		13 Rectus major posticus	101
1 The mammary, or that artery		14 Obliquus superior	101
which is distributed upon the		Muscles of the Loins.	
breast	110	X Spinalis	102
2 The brachial artery	110	z Transversalis lumborum	102
3 The cubital artery	110	26 Quadratus lumborum	102
4 The radial artery	110	Muscle of the Shoulder-Blade.	
5 The axillary vein	118	15 Trapezius	103
6 7 Arteries spread upon the neck		Muscles of the Arm-bone.	
and shoulder	110	16 Supra-spinatus	103
7 Veins spread upon the neck and		17 Infra-spinatus	103
shoulder	118	18 Deltoides	103
8 The cephalic vein	118	Muscles of the Fore-arm.	
m The internal cephalic vein	118	19 Biceps	103
9 The basilic vein	118	20 Brachiaëus internus	103
10 The median or middle vein	118	21 Anconæus	104
11 The external cephalic vein	118	Muscles of the Second Bone of the	
12 A branch communicating with		Fore-arm.	
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13 A vein called the salvatella	118	Muscles of the Palm of the Hand.	
The Blood-Vessels of the Thigh and		24 Palmaris longus	104
Leg.		25 Palmaris brevis	104
14 15 The crural artery	113	Muscles of the Thigh.	
16 The first branch of the crural		27 Psoas magnus	105
artery after its division	113	28 Iliacus externus	105
17 The second branch	114	30 Glutæus maximus	105
18 The crural vein	121	31 Glutæus medius	105
19 A vein called the saphæna	121	Muscles of the Leg.	
m A vein called the poplitæa	121	32 Vastus externus	105, 106
20 Veins that run down the back-		33 Vastus internus	105, 106
side of the leg	121	34 Poplitæus	105, 106
21 The internal veins of the leg	121	Muscle of the Foot.	
22 The external veins of the leg	121	37 Tibialis anticus	106
The following parts, marked with		Muscle of the Toes.	
RED FIGURES, are some of the		36 Extensor brevis	106
muscles not yet mentioned.		Muscles of the Great Toe.	
Muscle of the Skin of the Head.		35 Extensor longus	106
1 Corrugator	100	38 Flexor brevis	106
Muscle of the Eye-lids.		39 Abductor	106
2 Orbicularis	71	Muscle of the Little-Toe.	
Muscles of the Lips.		40 Abductor minimi digiti	107
3 Elevator labij superioris	100	More muscles might have been	
4 Zygomaticus minor	100	marked here, but I will refer you	
5 Elevator labiorum communis	100	to Case W. where they appear very	
6 Depressor labiorum communis	100	plain.	
8 Sphincter labiorum	100	Nº 2.	
9 Depressor labij inferioris	100	In this figure you have a prepara-	
Muscle of the Cheeks.		tion of the receptacle of the chyle,	
7 Buccinator	100	the thoracic duct, aorta, or great ar-	
Muscles of the lower Jaw.		ttery, the origin of the subclavian ar-	
10 Temporalis	101	teries,	
11 Masseter	101		

teries, carotide and cervical arteries ; also of the descending cava, subclavian veins, internal and external jugulars, and of the azygic vein.

- β The receptacle or reservoir of the chyle 22
 Γ The thoracic duct, or canal entering the left subclavian vein 23
 19 Aorta ascendens, or the great ascending artery 48, 108
 a b c. The origin of the three principal branches which go to the arms and head, arising from the curvature of the aorta 48, 108
 2 Aorta descendens, or the great descending artery

- 3 The carotide arteries 108
 4 The subclavian arteries 109
 5 The cervical or vertebral arteries 109
 6 The descending cava, or superior great vein 48, 116
 7 The subclavian veins 117
 8 The internal jugular veins 117
 9 The external jugular veins 117
 10 The azygic vein 116
 6, 7 The two last vertebræ, or joints of the neck 6
 1—12 The twelve vertebræ, or joints of the back 6
 1, 2 The two first vertebræ of the loins 6

C A S E D. N^o 1.

Is the superior part of a woman, in which the womb is laid aside, for exhibiting to view the position of the midriff in the last month of a woman's pregnancy, the main trunks of the great vessels, the urinary parts, and parts of generation. The womb is likewise cut open to shew its thickness, the adhesion of the placenta or womb-cake, the navel string, and the child presenting itself to the birth.

- X The cartilage at the end of the breast-bone 9
 A The adipose membrane or fat covering of the body 14
 * 4 The straight pair of muscles of the belly 16
 2 Diaphragm or midriff 45
 3 The lower end of the gullet, which joins the left orifice of the stomach 17, 18
 4 Aorta, or great artery 108, 111
 5 The superior mesenteric artery 111
 6 The emulgent arteries 24, 111
 7 Spermatic or seed arteries 26, 33, 112
 8 The iliac arteries 113
 9 Vena cava, or inferior great vein 119
 10 The three veins from the vena cava that go to the liver 119
 11 The emulgent vein 24, 120
 12 The left spermatic vein 24, 33, 120
 13 The iliac veins 121
 14 The deputy kidneys or renal glands 25, 134
 a b Their blood-vessels 25, 112, 120
 15 The kidneys 23
 16 The Ureters or urinary canals 24
 17 The womb 31
 18 Its broad ligament 31
 19 The ovaries, with white spots on their surface called the eggs 34

- 20 The Fallopian tubes 34
 21 Their fringes or jaggs 34
 22 The fœtus presenting itself to the birth, but here in a lateral situation, because the womb is laid aside 41
 23 The womb-cake or after-birth 38
 24 The umbilical rope or navel-string 39

N^o 2.

Is the urinary parts, and parts of generation in women.

- 1 The two lips 29
 2 Clitoris 29
 3 Its cavernous or spongy bodies 29
 4 Its two muscles called erektors 29
 5 Its blood-vessels 30, 113, 120, 132
 6 Nymphæ 29
 7 The orifice of the vagina, or entrance to the womb 30
 9 The myrtiform caruncles 30
 10 The urinary passage 30
 11 Vagina or avenue to the womb 30
 12 The womb 31
 13 Its mouth or opening 32
 14 Its broad ligament 31
 15 Its round ligament 31
 16 Spermatic or seed arteries 26, 33, 112
 17 The spermatic veins 26, 33, 120
 18 The arteries of the womb 33, 112, 113

19	The veins of the womb	33, 120	43	The external iliac arteries	113
20	The ovaries, with small white spots on their surface, called the eggs	34	44	The internal iliac arteries	113
21	The Fallopian tubes	34	45	The origin of the three veins which go to the liver	119
22	Their fringes or jaggs	34	46	The origin of the lumbar veins	120
23	Aorta, or great artery	108, 111	47	The iliac veins	120
24	Vena cava, or great vein	116, 119	48	The external iliac veins	120
25	The emulgent arteries	24, 111	49	Sphincter vesicæ, or that muscle which contracts the neck of the bladder	102
26	The emulgent veins	24, 120	50	The internal iliac veins	120
27	The deputy kidneys or renal glands	25, 134		N ^o 3.	
a b	Their blood vessels	25, 112, 120		Is a natural preparation of a nun.	
28	The kidneys	23	1	Venus's mount	29
29	The ureters or urinary canals	24	2	Clitoris	29
30	The bladder	24	3	The urinary canal	30
31	Its arteries	113	4	Hymen	30
32	Urachus	24, 39	5	Anus	19
33	The straight gut	19		N ^o 4.	
36	Anus, or extremity of the straight gut	19		Is the womb with its appendages.	
34	Its muscles called levators	19	1	Clitoris	29
35	A muscle surrounding it termed sphincter	19	2	Its cavernous or spongy bodies	29
37	The origin of the cæliac artery	111	3	Vagina, or avenue, 30. to	
38	The rise of the superior mesenteric artery	111	4	The womb	31
39	The origin of the inferior mesenteric artery	112	5	The mouth of the womb	32
40	The rise of the lumbar arteries	112	6	Broad ligaments of the womb	31
42	The iliac arteries	113	7	The ovaries, with small white spots on their surface, called the eggs	34
			8	The Fallopian tubes	34
			9	Their fringes or jaggs.	34

C A S E E.

In which is the figure of a man, whose brain is inverted and divested of its blood vessels, to shew the origin of the ten pair of nerves. The contents of the neck, chest, and belly are beautifully represented. On the right side are some of the external muscles, and the left is a fine ligamentary skeleton, in which the epiphyfes, or appendices of the bones, are demonstrated.

The BONES.		E	Radius, or spoke-like-bone	10
1 2 3 4 5 6 7	The seven true ribs	8	F	Ulna, or ell-bone
1 2 3 4 5	The five false ribs	8	w	Its upper extremity, or tip of the elbow
B	The collar-bone	9		10
C	The shoulder blade-bone	9	Δ	A ligament which joins the two fore-arm bones sideways
a	Its sharp prominence	9		10
b	Its broad protuberance	9	1 2 3 4 5 6 7 8	The eight bones of the wrist
c	Its spine or ridge	9		10
Z	A ligament or band, which unites the two prominences, and enlarges the cavity for the head of	9	f f f f	The four bones of the back of the hand
D	The arm-bone	10	g g g g g	The bones of the fingers and thumb
y	A ligament surrounding the head of the arm-bone	10	h h h h h	
e e	The lower extremity of the arm-bone	10	i i i i i	
			G	The haunch-bone
			k	Its spine
			H	The hip-bone
			I	The

I	The share-bone	8	18	Aorta, or great artery	111
K	The thigh-bone	11	O	The external iliac arteries	113
a	A ligament furrounding the head of the thigh-bone	11	19	Vena cava, or great ascending vein	119
m n	Its greater and lesser protube- rances	11	S	The external iliac veins	120
o	Its neck	11	20	The emulgent artery	24, 111
p p	Its two lower protuberances	11	21	The emulgent vein	24, 120
L	The knee-pan	11	22	The kidneys	23
M	The shin, or great bone of the leg	12	23	The renal glands, or deputy kid- nies	25
q	Its lower process making the in- ner ancle	12	a b	Their arteries and veins	25, 112, 120
γ	Its upper epiphysis or appendix	12	24	The ureters, or urinary canals	24
δ	Its lower appendix	12	25	The bladder, its external coat is taken off to shew its muscular or second coat	24
N	The lesser bone of the leg	12	26	The spermatic or feed arteries	26, 112
r	Its lower part making the outer ancle	12	27	The spermatic veins	26, 120
E	Its upper appendix	12	28	Its left testicle inclosed in its coat	25
ξ	Its lower appendix	12	29	Its muscle called cremaster	25
θ	A ligament which unites the bones of the legs sideways	12	30	The right testicle laid bare to shew its vessels	25
1 2 3 4 5 6 7	The seven bones of the instep	12	31	Its protuberance termed epididy- mis	26
t t t t t }	The bones of the toes	12	32	Vasa differentia, or the ejaculato- ry vessels	26
v v v v v }			33	The seminal vessels	26
x x x x }	The CONTENTS of the BELLY, &c.		34	Prostata, or a body situate before the neck of the bladder	26, 134
1			35	Cowper's glands	27, 134
2	Its upper orifice joining the gullet	18	36	Urethra, or urinary canal	27
3	Its lower orifice joining the first small gut	18	37	Glans, or nut of the yard	27
4	The liver	20	38	The yard laid bare to shew its artery, vein, and nerve	27, 113 120, 132
5	The gall-bladder	21	39	Præputium, or fore-skin	27
6	The round ligament or band of the liver	20	40	Scrotum, or common bag of the testicles	25
7	Pancreas or sweet-bread	21	41	Erectores, or first pair of muscles of the yard	27
8	The spleen	22	The CONTENTS of the CHEST.		
a	Its artery	22, 119	1	The midriff	45
b	Its vein	22, 121	2	The heart	47
9	Duodenum, or first small gut	18	3	The descending and ascending ca- va, or the superior and inferior great vein	48, 116, 119
10	The pancreatic and common bile canals opening in the inside of the duodenum	21	4	The right auricle of the heart	48
11	Jejunum, or second small gut	19	5	The right ventricle	47
12	Ileum, or third small gut	19	6	The pulmonary artery	48, 54, 107
13	Cæcum, or first great gut	19	7	That branch of it which goes to the left lobe of the lungs	48, 54, 107
z	Its appendix	19	8	A	
15	Colon, or second great gut	19			
14	Its valve	19			
16	Rectum, or straight gut	19			
17	Its muscle called sphincter	19			

8	A fine view of the branches of the pulmonary artery in the right lobe of the lungs	48, 54, 107	38	The palate	92
11	The left auricle of the heart	49	39	Uvula	92
12	The left ventricle	47		Two pair of Muscles of the Uvula.	
X	The coronary vessels of the heart	49, 108	40	Pterygo-staphilinus internus	92
13	Aorta, or great artery	48, 108	41	Pterygo-staphilinus externus	92
a b c	The origin of the three great branches that go to the arms and head	48, 108	42	The maxillary gland	90
14	The great descending artery	48, 111	43	The parotide gland	90
15	A fine representation of the bronchi, or air-vessels in the lungs	53	44	Its canal	90
16	The little lobes of the lungs, adhering like so many grapes to the sides of the air-vessels	53		Muscles of the Lower-Jaw.	
	The CONTENTS of the NECK and MOUTH, with several parts about the HEAD.		45	Masseter	101
17	The wind-pipe	57	46	Temporalis	101
18	The thyroid gland	58	47	A part of the pericranium	61
19	Larynx, or upper part of the wind-pipe	57		The BRAIN.	
g	The tongue-bone	5, 91	1	Cerebrum, or fore-part of the brain inverted	95
20	The subclavian veins	117	2	Cerebellum, or hind part of the brain	68
21	The external jugular vein	117	3	The annular process	68, 69
22	The internal jugular veins	117	4	Corpora pyramidalia, or the pyramidal bodies	69
23	The carotide arteries	108, 109	5	The first pair of nerves	125
24	The vertebral or cervical arteries	109	6	The second ditto	125
25	The subclavian arteries	109	7	The third ditto	125
26	The temple artery	108	8	The fourth ditto	126
27	An artery passing along the edge of the lower-jaw	108	9	The fifth ditto	126
28	Arteries that go to the wind-pipe	108	10	The sixth ditto	127
29	Veins that go to the wind-pipe	117	11	The seventh ditto	127
30, 31	Veins that go to the muscles of the mouth and tongue	117	12	The eighth ditto	128
32	Veins that go to the temple	117	13	The ninth ditto	129
33	Veins that go to the back-part of the head	117	14	Infundibulum, or funnel	69
34	Veins that go to the base of the skull	117	20	A part of the right side of the brain cut off to shew its two different substances	65
35	The gullet lying under the wind-pipe	17		See the BASE of the SKULL.	
36	Epiglottis, or that cartilage which covers the orifice of the larynx	57	15	The vertebral or cervical artery	109
37	Pharynx, or upper part of the gullet	17	16	The communicant arteries	109
			19	The entrance of the carotide arteries	109
				Arteries on the Right-side.	
			1 2 3	Several arteries distributed on the breasts, arm-pit, shoulder, and neck	110
			m	The axillary artery	110
			4	The brachial artery	110
			5	The cubital artery	110
			6	The radial artery	110
			7, 8	The crural artery	113
				The following parts, marked with RED FIGURES, are some muscles not yet mentioned.	
				Muscles of the Chest.	
			1	Intercostales externi	102
				Muscles	

Muscles of the Fore Arm.

2 Biceps 103, 104

3 Longus, Brevis 103, 104

Muscles of the Radius, or Second
Bone of the Fore-arm.

4 Spinator brevis 104

5 Quadratus 104

Muscle of the Wrist.

6 Flexor carpi ulnaris 104

Muscle of the Thumb.

7, 8 Extensor pollicis 105

9 The tendons of the muscles that
extend the wrist and fingers,
more plainly in Case W.

Muscle of the Loins.

10 Quadratus lumborum 102

Muscles of the Thigh.

11 Psoas magnus 105

12 Iliacus internus 105

13 Glutæus minimus 105

Muscles of the Leg.

14 Rectus 105, 106

15 Vastus externus 105, 106

16 Vastus internus 105, 106

17 Cruræus 105, 106

Muscle of the Foot.

18 Gastrocnemius externus 106

Muscle of the Toes.

19 Extensor longus 106

C A S E F.

In which is a woman, whose brain is divided lengthways to shew the ventricles of the brain, the sinuses or canals of the dura mater, the origin and egress of the nerves. The breast-bone is raised for exhibiting to view the contraction of the cavity of the chest, and the pressure of its parts in the last months of a woman's pregnancy. In the left breast you have a fine sight of the milky canals. In the belly the intestines are taken out and placed upon the left, to shew the situation of the child turned for the birth, the distention of the vessels of the womb, &c.

The BONES.

Z The skull 2

A The breast-bone 9

X Its cartilage or gristle 9

B The collar-bone 9

I The share-bone

A The adipose membrane, or fat
covering of the body 14The MUSCLES and CONTENTS of
the BELLY.

*1 The oblique descending muscles 15

*2 The oblique ascending muscles 15

*4 The straight muscles 16

*5 The transverse muscles 16

1 The stomach 17

C The liver, 20. 0 Its round liga-
ment or band 20

D Vena portæ 20, 121

7 The gall-bladder 21

8 The spleen 22

B The splenic artery 22, 111

C The splenic vein 22, 121

9 Pancreas or sweet-bread

0 The pancreatic duct 21

10 The intestines or guts 18

11 Cæcum, or first great gut 19

12 Colon, or second great gut 19

13 Rectum, or straight gut 19

14 The ureters or urinary canals 24

15 The bladder 24

16 Urethra, or the urinary passage 30

The EXTERNAL PARTS of GENE-
RATION.

17 Venus's mount 29

18 The lips 29

19 Clitoris 29

20 The two cavernous or spongy
bodies 2921 Erectores, or the muscles of the
clitoris 2922 The blood vessels and nerves of
the clitoris 30, 113, 120

23 The two nymphæ 29

The INTERNAL PARTS of GE-
NERATION.

24 The womb 31

25 Its broad ligaments or bands 31

26 Its round ligaments 31

27, 28 The veins and arteries that
go to the bottom of the womb

33, 112, 113, 120

29, 30 The veins and arteries that
go to the mouth and neck of the
womb 33, 112, 113, 12031 The spermatic or seed arteries
and veins 33, 112, 12032 The ovaries, with small white
spots on their surface, called
the eggs 34

33 The

33	The Fallopiā tubes	34	The Blood-Vessels in the Left-Arm.
aa	The umbilical arteries	38, 113	1 The axillary arteries and veins
z	The urachus	24, 39	110, 118
34	The child in a right position for the birth	41	2 The arteries and veins of the left breast
	The CONTENTS of the CHEST.		110, 118
X	A fine representation of the milky tubes in the left breast	44	3 The crural artery
Y	The right breast separated	44	113
1	The midriff	45	4 The crural vein
2	The heart-purse	46	121
3	The heart	47	5 A vein called the saphæna, marked in both sides
4	The lungs	53	121
	The BRAIN.		The following parts, marked with RED FIGURES, are some muscles not yet mentioned.
5	Pericranium, or a membrane immediately covering the out-side of the skull	61	Muscles of the Chest.
6	Temporalis, a muscle of the lower jaw	101	2 Serratus major anticus
7	Dura mater, or the external covering of the brain	62	102
8	Pia mater, or the third covering of the brain	64	3 Intercoſtales externi
9	Falx, or first process of the dura mater	62	102
10	The longitudinal sinus, or first canal of the dura mater	62	4 Intercoſtales interni
11	The lateral sinuses, or the second and third canals	62	102
12	The fourth sinus or canal	63	Muscle of the Cheeks.
13	Torcular, or union of those four canals	63	5 Quadratus genæ
14	The superior sinuses, or the fifth and sixth canals	63	100
15	The ninth sinus or canal	63	Muscle of the Shoulder-blade.
16	The inferior longitudinal sinus, or the eleventh canal	63	6 Elevator
17	Corpus callosum, or the covering of	65	103
a	The two lateral ventricles	65	Muscles of the Arm-Bone.
18	Corpora striata, or the striated bodies	66	7 Pectoralis
19	Thalami nervorum opticorum, or the beds of the optic, or second pair of nerves	66	103
20	Medulla oblongata, or the oblong marrow	68	8 Deltoïdes
21	The first pair of nerves of the brain	125	103
22	The second pair of nerves	125	Muscles of the Fore-Arm.
23	The third pair of nerves, near them is the pituitary gland	67, 133	9 Biceps
24	The fourth pair of nerves	126	10 Brachiaëus internus
25	The fifth pair of nerves	126	103
			11 Brevis
			104
			12 Longus
			104
			13 Brachiaëus externus
			104
			14 Anconæus
			104
			Muscles of the Radius, or Second Bone of the Fore-Arm.
			15 Rotundus
			104
			16 Supinator longus
			104
			Muscles of the Wrist.
			17 Flexor carpi radialis
			104
			18 Extensor carpi radialis
			104
			19 Extensor carpi ulnaris
			104
			Muscles of the Fingers.
			20 Extensor digitorum communis
			104
			21 Perforans
			104
			22 Perforatus
			104
			Muscles of the Thumb.
			23 Extensor, primi, secundi, tertij internodij
			105
			Muscles of the Leg.
			24 Rectus
			106
			25 Vastus externus
			106
			26 Membranofus
			105
			27 Sartorius
			106
			28 The tendon that fixes the knee-pan to the shin-bone.
			More

More muscles might have been here | I choose to let them alone, and refer described, but not clearly ; therefore | you to Case W.

C A S E G.

In which is a woman with a Grecian head, whose belly and womb are opened; and the intestines turned aside to shew the situation of the foetus in the seventh month; the adhesion of the placenta, or after-burthen, to the bottom of the womb and the navel-string. The skin is cut in several places to shew its different thickness in different parts; and the directions of the fibres of the muscles, according to the different positions of the body.

Some of the MUSCLES and CON- TENTS of the BELLY.

A The adipose, or fat covering of the body	14
* 4 The straight muscles	16
* 5 The transverse muscles	16
6 The intestines or guts	18
7 Ileum, or last small gut	19
8 Cæcum, or first great gut	19
10 The mesentery	20
11 The womb	31
12 The Fallopian tube	34
13 The womb-cake	38
14 The navel-string	39
15 The situation of the foetus in the seventh month	40
The parts, marked with RED FIGURES, are some muscles.	
Muscles of the Arm-Bone.	
1 Pectoralis major	103
2 Deltoides	103

Muscles of the Fore-Arm.

3 Biceps	103
4 Brevis	104

Muscles of the Wrist.

5 Extensor carpi radialis	104
7 Extensor carpi ulnaris	104
9 Flexor carpi ulnaris	104
11 Flexor carpi radialis	104

Muscles of the Fingers.

6 Extensor digitorum communis	104
8 Perforans	104
10 Perforatus	104

See the Sole of the Foot.

Muscle of the Foot.

12 Solæus	106
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Muscle of the Toes.

13 Perforatus	106
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Muscle of the Great-Toe.

14 Adductor	106
-------------	-----

Muscle of the Little-Toe.

15 Abductor minimi digiti	107
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C A S E H.

In which is a woman; the superior part of whose skull is taken off, to shew the upper part of the brain cover'd with the dura and pia mater; the belly and womb are open'd for observing the situation of the foetus, presenting itself for the birth by the feet; &c. The skin of the right-arm is separated, and most of the Muscles are demonstrated.

A The adipose, or fat covering of the body

14

The MUSCLES and CONTENTS of the BELLY.

* 1 The oblique descending muscles	15
* 4 The straight muscles	16
* 5 The transverse muscles	16
6 Jejunum, or second small gut	19
7 Ileum, or third small gut	19
8 Cæcum, or first great gut	19
9 Colon, or second great gut	19
10 Venus's mount	29
11 The lips of the womb	29
12 Nymphæ	29
13 Clitoris	29
14 Its legs, or spongy bodies	29

15 Its muscles called erectores	29
16 Its blood-vessels and nerves	30,
	113, 120
17 The urinary canal	30
18 The womb	31
19 The womb-cake	38
20 The navel-string	30
21 The foetus presenting itself for the birth by the feet	40, 41

The BRAIN.

1 The skin, muscles, and pericranium folded down	61
2 Dura mater turned down on the left side	62
3 A view of the brain on the right side, with the dura mater	62

4	A view of the brain on the left side, with the pia mater	64	12	Perforans	104
5	The longitudinal sinus, or first canal of the dura mater.	62	14	Interossei externi	104
The following parts, marked with RED FIGURES, are some muscles.					
Muscle of the Arm-Bone.					
1	Deltoides	103	Muscles of the Thumb.		
Muscles of the Fore-Arm.			15	Extensor primi internodij	105
2	Biceps	103	16	Extensor secundi internodij	105
3	Brachiaëus internus	103	17	Extensor tertij internodij	105
4	Brevis	104	18	Adductor	105
5	Longus	104	Muscles of the Fore-finger.		
6	Anconæus	104	19	Extensor	105
Muscles of the Radius, or second Bones of the Fore-Arm.			20	Adductor	105
7	Rotundus	104	Muscle of the Little-finger.		
8	Supinator longus	104	21	Abductor	105
Muscles of the Wrist.			22	The annular ligament, which compresses and keeps together the bones of the wrist, and the tendons of the muscles of the fingers.	
9	Extensor carpi radialis	104	See the Leg.		
11	Extensor carpi ulnaris	104	Muscle of the Foot.		
13	Flexor carpi radialis	104	23	Tibialis anticus	106
Muscles of the Fingers.			Muscle of the Great-Toe.		
10	Extensor digitorum communis	104	24	Extensor longus	106
			M	The shin-bone	12

C A S E I.

In which is a system of the nerves, &c.

The BONES.

X	The upper part of the skull covered with the periosteum	2	h	The first branch	126
1 2 3 7	Vertebræ, or joints of the neck	6	i	The second branch	126
3 7 8	Some of the joints of the back	6	k	The third branch	126, 127
1 2 5	Joints belonging to the loins	6	6, 6	The sixth pair of nerves	127
T	The sacred bone	6	m m	The intercostal nerve	129, 130
V	The rump bone	7	F F	The spinal marrow	69, 130
A	The four lobes of the brain	65	1 2 3 4 5 6 7	The seven pair of nerves of the neck	130
B	Cerebellum, or hind-part of the brain	68	G	Plexus, or knot of nerves that go to the arm, 130. afterward divided into	
1	The first pair of nerves of the brain	126	1 2 3 4 5 6	Six branches	130
2	The second pair of nerves	126	1 2 3 4 5 6 7 8 9 10 11 12	The twelve pair of nerves belonging to the back	131
a a	Two white prominences behind the infundibulum, or funnel	69	n n n	The five pair of nerves of the loins	131
c c	The trunks of the internal carotide arteries cut off	109	O	The crural nerve, 131. divided into	
D	The vertebral artery, 109. communicating with		1 2 3 4	Four branches	131
e e	The communicant branches	109	1 2 3 4 5 6	The six pair of nerves of the sacred bone	132
3	The third pair of nerves	125, 126	H H	The ischiatic nerve	132
4, 4	The fourth pair of nerves	126	p q	Its fore and hind branches	132
5	The fifth pair of nerves	126	Φ	Pharynx, or upper part of the gullet	17
f	The ganglio-form plexus	126	I	The	
g	The greater branch	126			

I The stomach	17, 18	N ^o 2.	
2 Its upper orifice joining the gullet,	18. on which are placed several	The brain with the ten pair of	nerves, &c.
branches of nerves from the eight	pair	1 The four lobes of the brain	65
3 The left kidney, 23. on which are	some branches of nerves from	2 Cerebellum, or hind-part of the	brain
the intercostal nerve	130	3 The two different substances of	the cerebrum
4 The midriff	45	4 The two different substances of	the cerebellum
5 Vena cava, or inferior great vein	passing thro' the midriff	5 The longitudinal sinus, or first	canal of the dura mater
6 Pericardium, or heart-purse	46	6 The two lateral sinuses, or the	second and third canals
7 The heart	48	7 The fourth sinus	63
8 Vena cava, or superior great vein	48, 116	8 Torcular, or the meeting of the	four former canals
9 The right auricle of the heart	48	9 The jugular bag	117
10 The right ventricle of the heart	47	10 The termination of the internal	jugular veins
11 The pulmonary vein, 116 divided	into	X The third ventricle of the brain	67
12 Right and left branches for each	lobe of the lungs	11 The first pair of nerves of the	brain
13 The left auricle of the heart	49	12 The second ditto	125
14 The left ventricle of the heart	47	13 The third ditto	125
15 Aorta, or great artery, 48, 108.	on which are several branches of	14 The fourth ditto	126
nerves from the eight pair of	the brain	15 The fifth ditto	126
a b c The origin of these arteries	which go to the head and arms	16 The sixth ditto	127
	48, 128	17 The seventh ditto	127
16 The carotide arteries	108, 109	18 The eighth ditto	128
17 The subclavian arteries	109	19 The ninth pair ditto	129
18 E The cervical or vertebral arte-	ries	20 The tenth pair ditto	129
	109	21 Infundibulum, or funnel, 67. be-	hind which are two white spots
20 The great descending artery	111		69
21 Larynx, or upper part of the wind-	pipe	22 The communicant branches of	
	57	23 The vertebral artery	109
22 The thyroid gland	58	24 A branch of the carotide artery	running between the two lobes
23 The wind-pipe	57	of the brain	109
Two Muscles of the Larynx, marked	with RED FIGURES.	25 The annular process	69
2 Hyo-thyroidæus	58	26 The spinal marrow	69
3 Crico-thyroidæus	58		

C A S E K.

In which the four cavities of a male subject, viz. the head, neck, chest, and belly are laid open to shew the natural situation and proportion of their under-mentioned contents, &c.

B The collar-bone	9	* The cavity in that bone for re-	
a The sharp prominence of the		ceiving the head of the arm-	
shoulder blade-bone	9	bone	9
b The broad protuberance of that		H The hip-bone	8
bone	9	I The share-bone	8
		1 The	

1 The round head of the thigh-bone	11	20 The kidnies	23
m The greater protuberance of that bone	11	d Aorta, or great artery	111
n The lesser protuberance of that bone	11	q The external iliac arteries	113
A The adipose, or fat covering of the body	14	e The inferior cava, or ascending great vein	119
The CONTENTS of the BELLY.		r The external iliac veins	120
1 The stomach, its upper part represents the second or muscular coat, and its lower the first or common coat from the peritonæum	17	f The emulgent veins	24, 120
2 Its left or upper orifice joining the gullet	18	21 The renal glands, or deputy-kidnies	25, 134
3 Its right or lower orifice with the valve joining the first gut	18	22 The ureters, or urinary canals	24
4 The liver, 20. on its inside are several small white vessels called lymphatics	23	23 The bladder, with its external or common coat	24
5 The gall-bladder	21	24 The spermatic, or seed arteries	26, 112
6 Its canal called the cystic duct	21	25 The spermatic veins	26, 120
7 The canal of the liver called the hepatic duct	21	26 The left testicle inclosed with its vessels in its external or vaginal coat	25
8 The common bile canal made by the union of the two former, entering the first small gut	18, 21	27 Cremaster, the muscle of the testicle	25
9 The round ligament, or band of the liver	20	X The spermatic vessels inclosed in their case	26
a Vena Portæ	20, 121	28 The right testicle laid bare with its vessels	25
10 Pancreas, or sweet-bread	21	29 Epididymus, or the appendix of the testicle	26
11 Its canal called the pancreatic duct	18, 21	y The inner coat of the testicle	25
11 The spleen	22	30 The ejaculatory vessels	26
b The splenic vein	22, 121	31 The seminal vessels	26
c The splenic artery	22, 111	32 Prostatæ, or a body situate before the neck of the bladder	26
n The mesenteric vein	121	m Its canals	26
12 Duodenum, or first small gut	18	33 Cowper's glands in the canal of the yard	27, 134
13 Jejunum, or second small gut	19	34 A transverse section in the penis for shewing its spongy substance, with a red line in the middle called the partition	27
14 Ileum, or third small gut	19	35 Urethra, or urinary passage laid open	27
15 Cæcum, or first great gut	19	36 Glans, or nut of the yard	27
16 Its appendix, or worm-like process	19	37, 39 The artery, vein, and nerves of the yard	27, 113, 120, 132
16 Colon, or second great gut	19	38 The umbilical arteries	38, 113
17 Rectum, or straight gut	19	40 Erectores, } or the first and second pair of	
X Sphincter, a muscle of the straight gut	19	42 Acceleratores, } muscles of the penis	27, 28
41 Levator, another muscle of the straight gut	19	43 The intercostal nerve past thro' the midriff	130
18 The mesentery, 20. with red spots on its surface called the mesenteric glands	22, 134	44 The same giving branches to the kidnies, &c.	130
19 The receptacle or reservoir of the chyle	22	The CONTENTS of the CHEST.	
		1 Diaphragm or midriff	45
		2 The	

2 The heart	47	14 The 4th, 5th, 6th, and 7th pair of nerves of the neck, and 1st of the back in the left side	130
3 The ascending, or inferior cava or great vein	119	Muscles of the Tongue-bone.	
4 The descending, or superior cava	48, 116	15 Coraco-hyoidæus	91
5 The right auricle of the heart	48	17 Sterno-hyoidæus	91
6 The right ventricle of the heart	47	24 Stylo-hyoidæus	91
7 The pulmonary artery, divided into		16 Mastoidæus, a muscle of the head	101
8 Right and left branches for	48, 54, 107	Muscles of the Larynx, or Upper Part of the Wind-Pipe.	
9 Each lobe of the lungs, which are here cut to shew their structure	53	18 Sterno-thyroidæus	58
10 The pulmonary vein entering	49, 53, 116	19 Hyo-thyroidæus	58
11 The left auricle of the heart	49	20 The tongue	89
12 The left ventricle of the heart	47	21 The maxillary gland	90
13 Aorta, or great artery	48, 108	22 Digastricus, a muscle of the lower jaw	101
14 The descending trunk of the great artery	111	25 Epiglottis, or the fifth cartilage of the larynx	57
15 The coronary veins	49	26 Pharynx, or upper part of the gullet	17
18 The azygic vein	116	23 Stylo-pharyngæus, a muscle of the pharynx	101
19 The intercostal nerve	129	27 The palate	92
21 The wind-pipe divided into two branches, called bronchi, or air- vessels, one for each lobe of the lungs	53, 57	28 Uvula	92
Φ The gullet	17	Two Muscles of the Uvula.	
Γ The thoracic duct or canal	23	29 Pterygo-staphilinus externus	92
The CONTENTS of the NECK and MOUTH.		30 Pterygo-staphilinus internus	92
1 The wind-pipe	57	31 The Eustachian ducts or canals	81, 82
2 The thyroid gland	58, 133	32 The intercostal nerve	129
3 Larynx, or upper part of the wind-pipe	57	33 The parotide gland	90
X The subclavian veins	117	The EYE.	
Z The external jugular vein	117	1 The lachrymal canals	71
6 The internal jugular veins	117	2 The lachrymal bag	71
7 The subclavian arteries	109	The BRAIN.	
8 The vertebral, or cervical arteries	109	1 Pia mater, or inner covering of the brain	64
9 The carotide arteries	108	2 The fore and hind lobes of the brain	65
10 The gullet	17	3 Cerebellum, or hind-part of the brain	68
11 The intercostal nerve receiving branches from the vertebral nerves, likewise divided into two branches, one passing above the axillary artery, and the other under it	129	4 The first pair of nerves of the brain	125
12 The large plexus or knot which goes to the arm	130	If you look into the base of the skull, you will see how this and the following pairs, marked with the same figures, go out of the skull.	
13 The same divided into five or six branches	130	5 The second pair of nerves	125
		6 The third ditto	125
		7 The fourth ditto	126
		8 The fifth ditto	126
		9 The seventh ditto	127
		10 The eighth ditto	128

11 A little below, you will see the ninth and tenth pair	129	8 Rectus major	101
12 The cervical, or vertebral artery	109	9 Rectus minor	101
13 The communicant branches	109	10 Mastoidæus lateralis	101
14 The carotide arteries	109	12 Complexus	101
15 The anterior branches of the caro- tide arteries	109	13 Splenius	101
16 Infundibulum, or funnel	67	Muscle of the Chest.	
17 The pituitary gland	67, 133	20 Serratus major anticus	102
Blood-Vessels on the Left-arm.		Muscle of the Scapula, or Shoulder- Blade-Bone.	
25 The axillary vein	118	14 Trapezius	103
26 The basilic vein	118	Muscles of the Arm-Bone.	
28 The axillary artery	110	15 Supra-spinatus	103
The following parts, marked with RED FIGURES, are some muscles not yet described.		16 Infra spinatus	103
Muscle of the Eye-Brow.		17 Teres minor	103
1 Corrugator	100	18 Subscapularis	103
Muscle of the Eye-lids.		19 Latissimus dorsi	103
2 Orbicularis	71	Muscle of the Fore-Arm.	
Muscles of the Nose.		21 Biceps	103
3 Elevator	100	Muscles of the Thigh.	
4 Dilatator	100	23 Glutæus maximus	105
Muscles of the Lips.		24 Glutæus medius	105
5 Sphincter labiorum	100	Muscles of the Leg.	
6 Depressor labij inferioris	100	25 Sartorius	106
Muscles of the Head.		26 Rectus	106
7 Obliquus superior	101	27 Vastus internus	106
		28 Vastus externus	106
		29 Cruræus	106

C A S E L.

In which the belly is emptied of its contents, except the womb, being laid open on one side to shew the natural situation of the fœtus, till it turns for the birth, the adhesion of the placenta, womb-cake, the navel string, &c.

I The share-bone	8	5 Vagina, or entrance to	30
K The thigh-bone	11	6 The womb	31
l Its round head	11	7 Its mouth	32
m A ligament, or band surrounding the head of the thigh-bone	11	8 Its broad ligament, or band	31
A The adipose, or fat covering of the body	14	9 The round ligament	31
*5 The transverse muscle of the belly	16	10 The spermatic, or seed arteries and veins	26, 33, 112, 120
1 The kidney dissected	23	11 The ovaries, with small white spots on that surface called the EGGS	34
2 The emulgent vein ramified thro' the substance of the kidney	24, 120	13 The womb-cake, or after bur- then	38
3 A double ureter, or urinary canal branched through the substance of the kidney on the right side	24	14 The natural situation of the fœtus, before it turns itself for the birth	41
3 The ureters on both sides entering	24	16 Diaphragm, or midriff	45
4 The bladder	24	17 Its two tendons	45
		18 Aorta, or great artery	108, 111
		19 Three	

Three Muscles of the Thigh.

19 Psoas	105
20 Iliacus	105
21 Obturator externus	105

23 The capsular ligament of the head of the thigh-bone, which assists in keeping it in its cavity.

C A S E M. N^o 1.

Is the spine consisting of twenty four bones divided into

1 2 3 4 5 6 7 The seven joints, or bones of the neck	6
1 — 12 The twelve of the back	6
1 2 3 4 5 The five of the loins	6
G The haunch-bone	8
k Its spine, or ridge	8
H The hip-bone	8
I The share-bone	8
R The cavity for receiving the head of the thigh-bone	11
T The sacred bone	6
V The rump-bone	7

N^o 2.

Is the liver and gall-bladder, with their canals, &c.

4 The liver	20
5 The gall-bladder	21
6 Its canal, called the cystic duct	21
7 The hepatic duct, or that canal which comes from the liver	21
8 The common bile duct	21
9 The round ligament, or band of the liver	20
10 Vena portæ	20, 121
11 An artery from the cæliac branch	111

N^o 3.

Is a bundle of guts, 18. with part of the mesentery, 20. on which are spread the lacteal vessels, 22. mesenteric glands, &c. 22, 134

N^o 4.

Is a piece of the lungs for shewing its spongy substance, the distribution of the pulmonary artery, vein, bronchi, or air vessels, and the lymphatic vessels, which are small white canals running upon its surface 54, 55

N^o 5.

Is the heart between the two lobes of the lungs

1 The descending cava, or the superior great vein	48, 116
2 The right auricle of the heart	48
3 The right ventricle of the heart	47
4 The pulmonary artery	48, 107

5 The right and left lobes of the lungs	53
6 The left auricle of the heart	49
7 The left ventricle of the heart	47
8 Aorta, or great artery	48, 108
9 The wind-pipe	57

N^o 6.

Is an arm and hand, with part of the skin taken off to shew the direction of the fibres of the common extensor muscle of the fingers 104

N^o 7.

Is an imitation of a child that lay twenty-six years in the belly of the mother, who lived in *Tholouse*, and died in the sixty-fourth year of her age.

N^o 8.

Is the diaphragm, or midriff inverted 45

1 The superior muscle of the midriff	45
2 The inferior muscle	45
3 Its tendinous part	45
4 The passage for the great artery	45
5 The passage for the gullet to the stomach, azygic vein, and thoracic duct	45
6, 7 Its arteries and veins called diaphragmatics	111, 119

N^o 9.

Is a preparation of the muscles of the pharynx, larynx, tongue, and tongue-bone; the glands of the mouth, lower jaw, &c.

1 The lower jaw, on the external surface of which are two holes for the exit of an artery, vein, and nerve to be distributed upon the chin	5
2 Its two protuberances which are received into the cavities of the os petrosum, or rocky bone	
3 Its other two processes for the insertion of the temporal muscles	
a a a a Incisores, or cutting teeth	5
b b Canini, the dog, or eye-teeth	5
c c c c c Molares, or grinders	5

5 Epiglottis, or the last cartilage of the pharynx, or upper part of the wind-pipe	57	The Muscles of the Tongue.	
6 Pharynx, or the superior part of the gullet	17	18 Basio-glossus	93
The Muscles of the Pharynx.		19 Cerato-glossus	93
7 Cephalo-pharyngæus	101	20 Mylo-glossus	93
8 Spheno-pharyngæus	101	21 Genio-glossus	93
9 Stylo-pharyngæus	101	Muscles of the Tongue-bone.	
10 Oeso-phagæus	101	22 Genio-hyoidæus	91
Muscles of the lower Jaw.		23 Mylo-hyoidæus	91
11 Pterigoidæus internus	101	27 Sterno-hyoidæus	91
12 Masseter	101	Muscles of the Larynx.	
13 The parotide gland, 90, 133. with its canal passing through		24 Hyo-thyreoidæus	58
14 The buccinator, or the muscles of the cheeks	100	25 Crico-thyreoidæus	58
16, 17 The maxillary glands	90, 133	26 Sterno-thyreoidæus	58
		28 The wind-pipe	57
		N ^o 10.	
		Is a natural preparation of the wind-pipe, bronchi, or air-vessels, on which is distributed the Ryschian, or bronchial artery	57; 111

C A S E N.

In which is the trunk of a woman, for exhibiting to view the egress of the ten pair of nerves of the brain, with *Willis's* accessory nerve, the orbit, or cavity of the eye, with its glands, canals, &c. the wind-pipe, with some glands and adjacent blood-vessels, several muscles of the face, head, neck, larynx, shoulder, blade, and arm-bone, &c.

B The collar-bone

The HEAD.

See the inside of the skull.

1 The first pair of nerves of the brain	125
2 The second ditto	125
3 The third ditto	125
4 The fourth ditto	126
5 The fifth ditto	126
6 The sixth ditto	127
7 The seventh ditto	127
8 The eighth ditto	128
9 The ninth ditto	129
10 The tenth ditto	129
11 <i>Willis's</i> accessory nerves	128
12 The beginning of the spinal marrow	69
13 The entrance of the carotide arteries	109
14 The pituitary gland	67, 133
15 The lateral, or second and third canals of the dura mater	62, 63
16 Torcular, or the meeting of the four greater canals of the brain	63

The EXTERNAL PARTS.

1 A continuation of the pericranium	61
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2 Temporalis, a muscle of the lower jaw	101
3 Corrugator, the muscle of the eye-brow	100
4 Orbicularis, a muscle of the eye-lids	71
5 Elevator nasi, a muscle of the nose	100
6 The orbit of the eye	70
7 The hole where the lachrymal canals enter the nose	71
8 The lachrymal gland	71
9 The pulley over which the greater oblique muscle of the eye passes	72

The Muscles of the Lips.

10 Elevator labij superioris	100
11 Elevator labij inferioris	100
12 Elevator labiorum communis	100
14 Sphincter labiorum	100
15 Depressor labij inferioris	100
16 Depressor labiorum communis	100
13 Buccinator, a muscle of the cheeks	100
17 Masseter, a muscle of the lower jaw	101
18 The parotide glands	90, 133
19 Its canal entering the mouth	90
20 An	

20 An artery from the carotide branch	108	Muscles of the Arm-bone.	
21 The maxillary glands	90, 133	34 Pectoralis major	103
22 Genio-hyoidæus, a muscle of the tongue-bone	91	35 Deltoides	103
23 Larynx, or upper part of the wind-pipe	58, 133	45 Infra-spinatus	103
24 The thyroid gland	58, 133	46 Teres major	103
25 The wind-pipe	57	48 Latissimus dorsi	103
Muscles of the Larynx.		Muscles of the Head.	
26 Hyo-thyreoidæus	58	38 Rectus minor posticus	101
27 Crico-thyreoidæus	58	39 Rectus major posticus	101
28 The subclavian vein	117	40 Obliquus superior	101
29 The internal jugular vein	117	41 Obliquus inferior	101
30 The external jugular vein	117	Muscles of the Neck.	
31 Veins that go to the wind-pipe and thyroid gland	117	36 Scalenus	101
32 The carotide artery	108	37 Mastoidæus lateralis	101
33 Quadratus genæ, a muscle of the cheeks and lower jaw	100, 101	42 Transversalis	101
		43 Interspinales colli	101
		Muscles of the Scapula, or Shoulder-Blade-Bone.	
		44 Trapezius	103
		47 Rhomboides	103

C A S E O. N^o 1 and 2.

Are two preparations wherein the four different methods of cutting for the stone are, with their inconveniences, plainly demonstrated, viz. 1. The lesser apparatus, or cutting on the gripe. 2. The greater apparatus, or the old way. 3. The high operation, and 4. The lateral operation.

N^o 1.

G The haunch-bone	8	18 Levatores, or muscles which pull up the straight gut	19
k Its spine or ridge	8	20 The bladder	24
H The hip-bone	8	31 The feminal vessels	26
I The share-bone	8	32 The prostate gland	26, 134
R The cavity for receiving the head of the thigh-bone	11	33 The yard, with its two spongy bodies	27
y A ligament, or band that connects the haunch, hip, and sacred bone together	7	34 Urethra, or urinary canal	27
z z Ligaments that assist in uniting the rump-bone, with the hip-bone	7	35 A ligament for fixing the yard to the share-bone	27
V The rump-bone	7	40 Erectores, or first pair of muscles of the yard	27
1 2 3 4 5 The five joints of the loins	6	41 Acceleratores, or second pair of muscles of the yard	28

N^o 2.

7 Aorta, or great artery	111, 112	I The share-bone	8
8 The external iliac arteries		R The cavity for receiving the head of the thigh-bone	11
9 The arteries that go to the sacred bone	112	T The sacred bone	6
10, 11 The internal iliac, or hypogastric arteries	113	7 Aorta, or the great artery	111, 112
12 The external hæmorrhoidal artery	113	8 The external iliac arteries	113
Two Muscles of the Thigh.		10, 11 The internal iliac, or hypogastric arteries	113
13 Psoas	105	12 Part of the peritonæum	16
14 Iliacus	105	13 Part of the psoas, or a muscle of the thigh	105
16 The straight gut	19	14 Part of the iliacus, another muscle of the thigh	105
17 One of its muscles termed sphincter	19		15

15 Part of the muscles of the belly	4 The liver	20
15, 16	5 The gall-bladder	21
16 The straight gut	6 The cystic duct, or the canal from the gall-bladder	21
17 Sphincter, or a muscle surrounding its extremity	7 The hepatic duct, or the canal from the liver	21
18 Levator, or a muscle which pulls it up	8 The common canal made by the union of the two former	21
19 Part of the ureter, or urinary canal	9 Vena portæ	20, 121
20 The bladder, with its muscle or fleshy coat	12, 13 The small guts	18, 19
21 Scrotum, or common testicle bag	14 Cæcum, or first great gut	19
25	Z Its appendix	19
22 The white, or inner coat of the testicle	16 Colon, or second great gut	19
23 The testicle	15 Its valve	19
24 A small body adhering to it called epididimus	17 The mesentery	20
26	18 The kidneys	23
31 The seminal vessels	19 The ureters, or urinary canals	24
32 The prostate gland	20 The bladder of urine	24
26, 134	21 The descending trunk of the aorta, or great artery	111, 112
33 The yard with its two spongy bodies	22 The vena cava descendens, or the inferior great vein	119, 120
27	23 The womb	31
34 Urethra, or urinary canal	24 The spermatic, or seed arteries and veins	26, 33
27	25 The ovaries, with small white spots on the surface called the eggs	34
41 A part of the accelerator, or second pair of muscles of the yard	26 The Fallopian tubes	34
28	aa The umbilical arteries	24, 38

N^o 3.

Represents a new born female child in which several parts of the brain, the contents of the chest and belly, especially the urinary parts, parts of generation, &c. are beautifully demonstrated.

The BONES.

A The breast bone	9
X Its cartilage or gristle	9
B The collar bones	9
A The adipose, or fat covering of the body	14

The MUSCLES and CONTENTS of the BELLY.

* 1 The oblique descending muscle	15
* 2 The oblique ascending muscle	15
* 4 The straight muscle	16
* 5 The transverse muscle	16
1 The stomach	17
2 Its lower or right orifice, separated from	18
3 The duodenum, or first small gut	18
3 The spleen	22

48, 116	4 The liver	20
47	5 The gall-bladder	21
48, 116	6 The cystic duct, or the canal from the gall-bladder	21
48	7 The hepatic duct, or the canal from the liver	21
47	8 The common canal made by the union of the two former	21
48, 107	9 Vena portæ	20, 121
53, 54	12, 13 The small guts	18, 19
49	14 Cæcum, or first great gut	19
47	Z Its appendix	19
48, 108	16 Colon, or second great gut	19
57	15 Its valve	19
103	17 The mesentery	20
102	18 The kidneys	23
102	19 The ureters, or urinary canals	24
102	20 The bladder of urine	24
102	21 The descending trunk of the aorta, or great artery	111, 112
102	22 The vena cava descendens, or the inferior great vein	119, 120
102	23 The womb	31
102	24 The spermatic, or seed arteries and veins	26, 33
102	25 The ovaries, with small white spots on the surface called the eggs	34
102	26 The Fallopian tubes	34
102	aa The umbilical arteries	24, 38
102	29 The urachus	24, 39, 113
102	27 The womb-cake, or after burthen	38
102	28 The navel-string	39
102	The Contents of the Chest.	
102	1 Pericardium, or heart-purse	46
102	2 The heart	47
102	3 The descending, or superior cava	48, 116
102	4 The right auricle of the heart	48
102	5 The right ventricle of the heart	47
102	6 The pulmonary artery, which goes to	48, 54, 107
102	7 Each lobe of the lungs	53, 54
102	8 The left auricle of the heart	49
102	9 The left ventricle of the heart	47
102	10 Aorta, or great artery	48, 108
102	11 The wind-pipe	57
102	12 Pectoralis major, a muscle of the arm-bone	103
102	Muscles of the Chest.	
102	13 Serratus major anticus	102
102	14 Intercostales externi	102
102	15 Intercostales interni	102

The BRAIN.

1 A continuation of the pericranium	61	of the two lateral ventricles of the brain	65
2 Temporalis, a muscle of the lower jaw	101	8 Corpora striata, or the striated bodies	66
3 Dura mater, or the external covering of the brain	62	9 Thalami nervorum opticorum, or the beds of the optic nerves	66
4 Falx, or the first process of the dura mater	62	10 The pineal gland	67, 133
m The eleventh sinus, or canal of the dura mater	63	11 Two protuberances called nates	66
5 Corpus callosum, or the covering		12 Part of the cerebellum; or hind-part of the brain	68, 132

C A S E P.

In which is a new born female child, wherein are exhibited to view the contents of the chest and belly, particularly the urinary parts, and parts of generation.

The BONES.

A The breast-bone	9	18 The kidneys	23
X Its cartilage, or gristle	9	19 The ureters, or urinary canals	24
B The collar-bone	9	20 The urinary bladder	24
1 2 3 4 5 The ribs	8	21 The womb	31
A The adipose, or fat covering of the body	14	22 The spermatic, or seed arteries and veins	26, 33, 112, 120
The MUSCLES and CONTENTS of the BELLY.		23 The ovaries, with small white spots on their surface called the eggs	34
*3 The pyramidal muscles	15	24 The Fallopian tubes	34
*4 The straight muscles	16	25 The womb-cake, or after birth	38
*5 Transverse muscles	16	26 The navel-string	39
1 The stomach	17	The Contents of the Chest.	
3 Its lower orifice joining the first gut	18	1 Diaphragm, or midriff	45
4 The liver	20	2 The heart	47
5 The gall-bladder	21	3 The right auricle of the heart	48
10 Pancreas, or sweet-bread	21	4 The right ventricle of the heart	47
6 Its canal, called the pancreatic duct	21	5 The lungs	53
11 The intestines	18, 19	6 The left ventricle of the heart	47
12 The mesentery	20	7 A gland called thymus	46, 133
13 The spleen	22	8 Pectoralis, a muscle of the arm-bone	103
16 The straight gut	19	Muscles of the Chest.	
17 Aorta, or the great artery.	111, 112	9 Serratus major anticus	102
6 The external iliac arteries	113	10 Intercostrales	102
e The external iliac veins	120		

C A S E Q.

In which is the head of a woman, whose brain is cut across to shew the lateral ventricles, pineal gland, its appendix, &c.

1 The brain, cut across	65	4 Thalami nervorum opticorum, or the beds of the optic, or second pair of nerves, covered with the corpus callosum	66
2 Corpus callosum, or the covering of the lateral ventricles	65	5 Plexus choroides, or a layer of blood-vessels	66
3 Corpora striata, or the striated bodies, covered with the corpus callosum	65		

7 Anus, or entrance to the fourth ventricle	67	12 Two protuberances named corpora olivaria, or the oval bodies	69
8 Pineal gland	67, 133	13 Cerebellum, or hind-part of the brain cut in each side to shew its substance	61
9 Two protuberances called nates	66	B The collar-bone	9
10 Two protuberances termed testes	66		
11 Two protuberances which go by the name of corpora pyramida-			

C A S E R.

In which is the head of a woman, whose brain is cut longitudinally, or lengthways through the middle, to shew the situation of the falx, its sinuses, or canals, corpus callosum, the lateral ventricles, pineal gland, origin, and egress of the nerves, &c.

A The brain	65	15 Plexus choroides, or a layer of blood-vessels	66
B Falx, or first process of the dura mater	62	16 Thalamus nervi optici, or the bed of the optic or second pair of nerves	65
1 The longitudinal sinus, or first canal	62	17 Anus, or the cavity which leads to the four ventricles of the brain	
2 The lateral sinuses, or second and third canals	62	18 The pineal gland	67, 133
4 The fourth sinus	63	19 The beginning of the spinal marrow	69
3 Torcular, or meeting of these four canals	63	20 The first pair of nerves	125
5 The superior sinuses, or the fifth and sixth canals	63	21 The optic, or second pair of nerves	125
7 The inferior sinuses, or the seventh and eighth canals	63	22 The entrance of the carotide artery	69, 109
6 The ninth canal	63	23 The cervical, or vertebral artery	69, 109
8 The circular sinus, or the tenth canal	63	24 The fifth pair of nerves	126
11 The inferior longitudinal sinus, or the eleventh canal	63	25 The seventh pair of nerves	127
12 Corpus callosum, or the covering of the lateral ventricles	65	26 The eighth pair of nerves	128
13 The two different substances of the cerebellum	68	27 Willis's accessory nerve	128
14 Corpus striatum, or the striated body	66	28 The ninth pair of nerves	129
		29 Temporalis, a muscle of the lower jaw	101

C A S E S and T.

Are two heads of *Cartouche*, a famous *French* robber, in which are dissected several muscles belonging to the head, neck, lower jaw, tongue-bone, larynx, with some of the glands of the mouth and throat, &c.

C Pericranium, or the immediate covering of the skull	61	The Muscles of the Tongue-Bone.	
g The tongue-bone	5, 91	6 Myo-hyoidæus	91
A The breast-bone	9	7 Genio-hyoidæus	91
B The collar-bone	9	9 Stylo-hyoidæus	91
1 2 The maxillary glands	90, 133	14 Sterno-hyoidæus	91
3 Larynx, or upper part of the wind-pipe	57	16 Coraco-hyoidæus	91
5 The wind-pipe	57	Muscles of the Lower-Jaw.	
		8 Digastricus	101
		10 The carotide arteries	108
		11 The internal jugular vein	117

Muscles of the Larynx.		20	Complexus	101
12	Hyo-thyreoidæus	58	Muscle of the Neck.	
13	Sterno-thyreoidæus	58	18	Scalenus
15	Crico-thyreoidæus	58	Muscle of the Scapula, or Shoulder-Blade-Bone.	
Muscles of the Head.				
17	Mastoidæus	101	21	Trapezius
19	Splenius	101		103

C A S E V.

In which are two female children, joined together by breast and belly, with two heads, four arms, four nipples, four legs, and one common navel-string. In the same case are the two real bodies of these children, which, when born, were almost of the same bigness with the wax ones, but their parts are now much contracted.

C A S E U.

In which is a head and neck, for shewing the situation of some glands, the passages of the wind-pipe and gullet, the dissection of several muscles, &c.

Muscles of the lower Jaw.		Muscle of the Neck.	
2	The zygomatic arch, formed by the union of these processes of the cheek and temple bones	8	Scalenus
	3, 4		Muscles of the Tongue-bone.
3	The temple artery from the carotide branch	11	Mylo-hyoidæus
	108	12	Genio-hyoidæus
a	The parotide gland, with its canal entering the mouth	13	Stylo-hyoidæus
	90, 133	18	Larynx, or upper part of the wind-pipe
10	The maxillary gland		Muscles of the Larynx.
	90, 133	15	Hyo-thyreoidæus
Muscles of the Lower-Jaw.		16	Sterno-thyreoidæus
1	Temporalis	19	Crico-thyreoidæus
4	Masseter	17	An artery from the carotide, running along the edge of the lower jaw
14	Digastricus		108
Muscle of the Lips.		20	The thyroid gland
b	Depressor labiorum communis		58, 133
Muscle of the Scapula, or Shoulder-Blade.		21	The wind-pipe
5	Trapezius	22	The gullet
	101	23	The internal jugular veins
Muscles of the Head.		24	The carotide arteries
6	Splenius	25	The spine
7	Complexus	26	The vertebral arteries
9	Mastoidæus	27	The spinal marrow
	101		69

C A S E W.

In which is the figure of a woman nine months gone with child. This is a fine and most amazing piece of art; for, besides the just and regular proportions every where observed, with the exact care in copying nature throughout the whole, even to the minutest parts, the agony she is in is most beautifully expressed in the face; the breasts are turgid, as it were, with milk, and their veins creeping under them; the external muscles and tendons, with their proper membranes, are so artfully, as it were, dissected, even to have deceived the most knowing. On the left side the muscles, with their tendons, are neatly separated or raised from one another, to shew the course of the arteries, veins, and nerves in their natural bigness and colour, which are traced to their extremities. The superior part of the skull is taken off for exhibiting to view the brain, with

with its blood-vessels running upon it; the neck is laid bare, the breast-bone raised, and the belly cut open to give you a full sight of their contents; but what still adds to the grandeur of this figure, is the womb largely distended, with its blood-vessels every where running through it; it is cut open for shewing how the little inhabitant endeavours to quit its prison, with its face turned upward, its head resting upon the share-bone, and one of its hands in the passage; the navel-string with its contortions of arteries and veins round each other, the adhesion of the after-burthen to the bottom of the womb; likewise the membranes which immediately contain the child with the waters round it. On the left side of this figure are some of the small guts, and under it the great guts, with the internal hemorrhoidal arteries and veins spread upon them.

The BONES.

A The breast-bone	9	27 The womb	31
X Its cartilage or gristle	9	28 Its broad ligaments or bands	31
B The collar bone	9	29 Its round ligaments	31
1 2 3 4 5 6 7 The seven true ribs	8	30 The spermatic, or seed-arteries	26, 112
1 2 3 4 5 The five false ribs	8	31 The spermatic veins	26, 120
A The adipose, or fat covering of the body	14	32 The ovaries, with small white spots on their surface, called the eggs	34
The MUSCLES and CONTENTS of the BELLY.		33 The Fallopian tubes	34
*1 The oblique descending muscle	15	34 The membranes which surround the foetus while in the womb, and contain the water	37
*2 The oblique ascending muscle	15	35 The womb-cake, or after-burthen	38
*4 The straight muscle	16	36 The navel-string	39
*5 The transverse muscle	16	37 The child in a wrong position for the birth, with its head resting upon the share-bones, its face forward, and its hand in the passage	41, 42
1 The stomach	17	The CONTENTS of the CHEST.	
2 The liver	20	1 Diaphragm, or midriff	45
3 The gall-bladder	21	X The adhesion of the pericardium, or heart-purse, to the tendinous part of the midriff	46
4 The spleen	22	2 The heart	47
6 The splenic artery	111	3 The ascending and descending cava, or inferior and superior great vein	48, 116, 119
7 The splenic vein	121	4 The right auricle of the heart	48
8 The small guts	18, 19	5 The right ventricle of the heart	47
9 The mesentery	20	6 The pulmonary artery	48, 54, 107
10 Part of the ileum, or last small gut, joining the	19	7 The lungs	53
11 Cæcum, or the first great gut	19	8 The pulmonary vein	116
12 Its appendix	19	9 The left auricle of the heart	49
13 Colon, or the second great gut	19	10 The left ventricle of the heart	47
14 Rectum, or the straight gut	19	11 Aorta, or the great artery	48, 108
15 A muscle called sphincter surrounding its extremity	19	The CONTENTS of the NECK, with some parts about the left Side of the Head.	
16 The internal hemorrhoidal artery	112		
17 The internal hemorrhoidal vein	122		
18 Pancreas, or sweet-bread	21		
19 Aorta, or great artery	111, 112		
20 The external iliac artery	113		
21 The external iliac vein	120		
22 The emulgent artery	24, 111		
23 The emulgent vein	24, 120		
24 The kidneys	23		
25 The ureters, or urinary canals	24		
26 The urinary bladder	24		

12 The wind-pipe	57	3 Pia mater, or the inner covering of the brain	64
12 The thyroid gland	58, 133	4 The longitudinal sinus, or first canal of the dura mater	62
14 Larynx, or upper part of the wind-pipe	57	The Arteries, Veins, and Nerves of the Arm.	
15 Quadratus genæ, a muscle of the cheeks and lower jaw	100, 101	1 The brachial artery	110
16 Mastoidæus, a muscle of the head	101	2 The radial, or external artery	110
18 Sterno-thyreoidæus, a muscle of the larynx	58	2 The cubital, or internal artery	110
20 Digastricus, a muscle of the lower jaw	101	4 The axillary vein	118
Muscles of the Tongue-bone.		5 A branch which goes to the shoulder	118
17 Sterno-hyoidæus	91	6 The cephalic vein	118
19 Coraco-hyoidæus	91	2 The external cephalic vein	118
21 Mylo-hyoidæus	91	m The internal cephalic vein	118
22 Genio-hyoidæus	91	7 The basilic vein	118
Muscles of the Tongue.		8, 9, 10 Its several branches	119
23 Genio-glossus	93	11 The median vein	118
25 Cerato-glossus	93	12 A vein called the salvatella	118
27 Scalenus, a muscle of the neck	101	13 Several branches of arteries from the axillary branch, spread upon the breasts and other adjacent parts	110
28 Elevator, a muscle of the shoulder-blade	103	14, 15, 16 The nerves of the arm	130
29 Complexus, a muscle of the head	101	17 The axillary gland	135
30 Trapezius, a muscle of the shoulder-blade	103	The Arteries, Veins, &c. of the Thigh, Leg, and Foot.	
31 The carotide artery	108	1 The crural artery	113
32 Veins that go to the wind-pipe, muscles of the tongue-bone and tongue	117	2 The first, or external branch of the crural artery	113
33 The external jugular veins	117	3 The crural vein	121
34 The subclavian veins	117	4 Saphæna, or a vein running along the inside of the thigh and leg	121
35 A branch that goes to the muscles of the neck	117	5, 6, 7 The other divisions of the crural vein	121
36 The internal jugular veins, divided into		m Poplitæa, or a vein which runs down the ham	121
37 Two branches	117	10 The external branch of the poplitæa	121
38 The 4, 5, 6, and 7 pair of nerves of the neck	130	11 The internal branch of the poplitæa	121
39 The maxillary glands	90, 133	11 The inguinal glands	135
40 The sublingual glands	90, 133	The following parts, marked with RED FIGURES, are some muscles not yet mentioned.	
41 The lymphatic glands	90, 133	Muscles of the Chest.	
42 The parotide glands, with its canals entering the mouth	90, 133	2, 2, &c. Inercostrales externi & interni	102
Two Muscles of the Lower-Jaw.		3, 3, &c. Serratus major anticus	102, 103
43 Masseter	101	4 Serratus minor anticus	102
44 Temporalis	101	n Sacro-lumbaris	102
The BRAIN.		Muscles	
1 The skin of the head with its muscles folded down	100		
2 The brain without its coverings	65		

Muscles of the Arm-Bone.		50	Triceps	105	
5	Deltoides	103	Muscles of the Leg.		
6	Pectoralis major	103	51	Gracilis	105
7	Teres major	103	52	Semimembranosus	105
8	Latissimus dorsi	103	53	Seminervosus	105
9	Subscapularis	103	54	Biceps	105
10	Infra-spinatus	103	55	Rectus	106
11	Teres minor	103	56	Vastus externus	106
12	Coraco-brachialis	103	57	Vastus internus	106
Muscles of the Fore-Arm.		58	Cruræus	106	
15	Biceps	103	59	Sartorius	106
16	Brachiaëus internus	103	60	Poplitæus	106
17	Longus	104	61	Membranosus	106
18	Brevis	104	Muscles of the Foot.		
19	Brachiaëus externus	104	62	Tibialis anticus	106
20	Anconæus	104	63	Peronæus anticus	106
Muscles of the Radius, or second		64	Gastrocnemius externus	106	
Bone of the Fore-Arm.		65	Gastrocnemius internus	106	
21	Rotundus	104	66	Tendo Achillis, or the strong ten-	
22	Quadratus	104	don of the two former muscles		106
23	Supinator longus	104	67	Tibialis posticus	106
The Muscles of the Wrist.		68	Peronæus posticus	106	
24	Flexor carpi radialis	104	The Muscles of the Toes.		
25	Flexor carpi ulnaris	104	70	Extensor longus	106
26	Extensor carpi radialis	104	71	Extensor brevis	106
27	Extensor carpi ulnaris	104	72	Perforans	106
Muscles of the Fingers.		73	Perforatus	106	
30	Perforatus	104	74	Lumbricales	106
31	Perforans	104	75	Interossei externi	106
32	Extensor digitorum communis	104	The Muscles of the Great-Toe.		
33	Lumbricales	104	76	Extensor longus	106
Muscles of the Thumb.		77	Extensor brevis	106	
35	Flexor tertij internodij pollicis	105	78	Flexor longus	106
36	Flexor secundi internodij	105	79	Flexor brevis	106
37	Extensor primi internodij	105	80	Adductor	106
38	Extensor secundi internodij	105	81	Abductor	106
39	Extensor tertij internodij	105	The Muscles of the Little-Toe.		
40	Abductor	105	82	Abductor minimi digiti	107
41	Adductor	105	84	Flexor minimi digiti	107
The Muscles of the Little-Finger.		85	Transversalis, a common muscle		
43	Extensor minimi digiti	105	of the great and little toe		107
44	Abductor	105	83	The annular ligament, which	
Muscles of the Thigh.			serves to compress and keep to-		
46	Psoas magnus	105	gether the subjacent muscles and		
47	Glutæus maximus	105	bones.		
48	Glutæus medius	105			
49	Glutæus minimus	105			

C A S E X.

In which is a girl about 12 years of age; on the right side the skin is left on from head to foot; on the left side is a most curious distribution of the arteries and veins, beautifully dispersed over the bones in their natural order, being taken from a subject in which the same had been injected and traced with the dissecting knife. The superior part of the skull is taken

taken off to shew the brain with its blood-vessels running upon it; the neck is laid bare, the breast-bone raised, and the belly cut open for exhibiting to view their contents in their natural figure, colour, and situation.

The BONES.

A	The breast-bone	9
X	Its cartilage or gristle	9
1 2 3 4 5 6 7	The seven true ribs	8
1 2 3 4 5	The five false ribs	8
a	The sharp process of the blade-bone	9
b	The broad prominence of the blade-bone	9
D	The arm-bone	10
G	The haunch-bone	8
K	The thigh-bone	11
l	Its round head	11
m n	Its greater and lesser protuberances	11
o	Its neck	11
p p	Its lower protuberances	11
L	The knee-pan	11
M	The shin, or great bone of the leg	12
q	Its lower process making the inner angle	12
N	The lesser or second bone of the leg	12
r	Its lower prominence making the outer angle	12
A	The adipose, or fat covering of the body	14
The CONTENTS of the BELLY.		
1	The stomach	17
2	Its upper orifice joining the gullet	18
3	Its inferior orifice united with the first gut	18
4	The liver	20
5	The gall-bladder	21
6	The common bile, or gall duct	21
7	Pancreas, or sweet-bread	21
8	Its canal, called the pancreatic duct	21
9	Duodenum, or first small gut	18
10	Ileum, or third small gut	19
11	Cæcum, or first great gut	19
12	Its appendix	19
13	Colon, or second great gut	19
14	Its valve	19
15	The spleen	22
18	The splenic artery	121
17	The splenic vein	121
19	The mesenteric vein	121
X	The internal hæmorrhoidal vein	122

20	Vena portæ	20, 121
21	Aorta, or great artery	111, 112
22	The upper mesenteric artery	111
23	The emulgent arteries	24, 111
24	The spermatic, or seed arteries	26, 33, 112
25	The inferior mesenteric artery	112
26	The external iliac arteries	113
27	The ascending cava, or inferior great vein	119
28	The emulgent veins	24, 120
29	The spermatic veins	26, 33, 120
30	The external iliac veins	120
z	The sacred vein	120
31	The kidneys	23, 134
32	The ureters, or urinary canals	24
33	The bladder of urine	24
34	The womb	31
35	The ovaries, with white small spots on their surface called the eggs	34
36	The Fallopian tubes	34

The CONTENTS of the CHEST.

1	Diaphragm, or midriff	45
2	Pericardium, or heart-purse	46
3	The heart	47
4	The right ventricle of the heart	47
5	The pulmonary artery	48, 54, 107
6	The lungs	53
7	The left auricle of the heart	49
8	The left ventricle of the heart	47
9	Aorta, or great artery	48, 108

The CONTENTS of the NECK.		
1	The wind-pipe	57
2	The thyroid gland	58, 133
g	The tongue-bone	5, 91
The Muscles of the Tongue.		
5	Genio-glossus	93
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A
C O M P E N D I U M
O F
A N A T O M Y.

In which are described the
FIGURE, SITUATION, CONNECTION,
and USES of the PARTS
O F T H E
Human Body.



L O N D O N :
Printed in the Year MDCCXXXIX.

A
TREATISE
OF
NUTRIMENT
IN
RELATION
TO
THE
HUMAN
BODY.



LONDON:
Printed in the Year MDCCXXIX

T H E P R E F A C E.



S this Book is the first of its kind that ever appear'd in such a Dress, it may be thought proper to say something by way of Preface, to shew the necessity of its being drawn up in the form it now is. There are no doubt a great number of better and much more accurate Books of Anatomy; I therefore claim no Merit to myself on that Account; besides, it was not my Intention to write on Anatomy, but on these Wax-Figures. How well I have succeeded in this Attempt, is in every Person's Power to determine. There is scarce a part in the Human Body which will not be known upon turning to a certain Number and Figure, carefully pointed at throughout this whole Treatise; so that the Learned may easily refresh their Memory, without going thro' the fatigue of Dissections, and those, who understand no Anatomy, will receive very good Ideas of the Human Fabrick, without much Trouble or Expence.

T H E Figures were the Labour of Monsieur DENOUE, Professor of Anatomy to the Academy of Sciences at Paris; who was above Forty Years employed in making them, and during that time had as many Bodies allowed him by the Royal Hospitals, as were necessary to compleat his Work, which now lies before the Publick.

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OF
OSTEOLOGY;
 OR, THE
 Doctrine of the BONES.

CHAP. I.
Of the BONES.

SECT. I.
Of the BONES in general.

THE Bones are, in respect to the body, as a wooden frame is to the whole building. They give it strength, sustain all its organs, and keep the animal in all situations proper for its functions, by means of their different conformation, structure, and connection. Therefore after having given a short account of their Articulations, we will so describe them, as to give the young Anatomist an idea thereof. Every ARTICULATION is so contrived, as to be either immovable, or capable of being moved.

The *first* is of two sorts. The first kind is the mutual indentation of one bone with another, as is visible in the skull; and the other the fastening of the teeth in their sockets, like a nail in wood.

B

The

Of the Bones of the Head.

The *second* is divided into three sorts. The first is the ball and socket, namely, when a large head is received into a deep cavity, as the upper end of the thigh-bone into the cavity of the nameless bone. The second is when a round head is received into a superficial cavity, as the upper end of the arm-bone into the cavity of the shoulder-blade. The last is where the parts of the bones mutually receive, and are received, as the lower end of the thigh-bone with the upper end of the greatest bone of the leg.

S E C T. II.

Of the Bones of the HEAD.

Cafe Z

THE skull consists of eight bones joined to one another by five seams; as the CROWN-SEAM, running cross the skull, and joining the wall-bones to the frontal; the ARROW-LIKE-SEAM, joining the wall bones; the ANGULAR-SEAM, joining the back part of the side bones to the upper part of the hind head-bone; the SCALY-SEAM, made by wrapping the upper part of the temple-bone over the lower edge of the side bone; and the TRANSVERSE-SEAM, running cross the face, through the bottoms of the orbits of the eyes.

These seams serve to allow the head, in time of birth, a change of shape, and accommodate it for the passage it is engaged in, to form it into a round figure; allow a communication of vessels between the external and internal parts; and to prevent fractures from reaching so far as they would, if the skull had been one bone.

Having touch'd upon the seams, with their uses, I now come to consider the bones that form the brain-case:

- I. The FRONTAL, or *Forehead-bone*, which is of a roundish form, and makes the fore-part of the skull,

Of the Bones of the Head.

3

skull, is joined above to the side bones, on the lower and side parts to the temple-bones, and on the lower and fore-part to the wedge-like bone.

This bone serves to contain the fore lobes of the brain, to form the forehead, the upper part of the orbits or eye sockets, and a part of the temples.

The two **PARIETAL**, or *side Bones*, one on each side. They are almost square, and joined to each other in the crown of the head, and to the other bones, in other parts. II.

These bones serve to contain a large portion of the brain, form part of the temples, serve for the insertion of the temporal muscles, &c.

The **OCCIPITAL**, or *hind head bone*, represents a kind of losenge, and is situate in the hind and lower part of the skull. This bone is joined above to the side bones, on the lower and side parts to the temple bones, on the lower and fore-part to the wedge-like bones, &c. III.

This bone serves to form the back part of the head, to join the head with the trunk; contain a part of the brain, afford the marrow of the brain, and a great many vessels and nerves passage, to give insertion to a great many muscles, &c.

The two **TEMPLE** bones, one on each side, almost of a half round figure, ending in several eminences. Each bone is joined above to the side bone; behind and below to the hind head bone, before to the wedge-like bone and cheek bones, and below to the wedge-like bone. IV.

These bones serve to compleat the globe of the skull, for the articulation of the lower jaw, for the insertion of several muscles, and to contain the bones of hearing, which are in number four, viz.

The **ANVIL**, situate under the hammer, and resembling in some measure one of the fore-grinders with its roots, at some distance from each other; the shorter of which is tied to one of the processes of the temple-bone, and the longer to the stirrup. I.

The **HAMMER** is a long bone with a large head, a small neck, a handle, and two protuberances; one in the neck, the other in the handle. The head and 2.

B 2

neck

Of the Bones of the Head.

neck are turned upward and inward, the handle downward.

3. The STIRRUP is divided into head, legs, and base. The head is placed on a short flat neck, the two legs form an arch like that of the stirrup, and the base resembles that of the stirrup both in shape and union with the legs.

4. The LENTICULAR bone, which is the smallest in the body, lies between the head of the stirrup, and the extremity of the long leg of the anvil.

- V. The SIEVE-LIKE-BONE, so called, because perforated by a number of small holes, is in some measure in form of a dye, and situate in the fore-part of the base of the skull. It is joined to the forehead bone, and with several other bones.

This bone serves to be the principal part of the organ of smell, and to enlarge in a small compass the pituitary membrane.

- VI. The WEDGE-LIKE-BONE is of a very irregular figure, situate in the lower part of the skull, and is joined with all the other bones of the skull. It has several eminences for several uses; likewise twelve holes for the exit of several nerves, and the passage of blood vessels.

The bones of the upper jaw, are thirteen in number, viz. six on each side, and one in the middle.

1. The CHEEK-BONE is almost a four-sided figure, situate in the side and middle part of the face, and is joined to several bones of the skull. This bone makes the prominent upper part of the cheek very visible in a lean person, and forms a part of the orbit of the eye, &c.

2. The JAW-BONE is of a very irregular figure, situate in the fore and middle part of the face, and connected with some bones of the skull, and some of the upper jaw.

This bone assists in forming the organ of chewing, the arch of the palate, the cheeks, the orbits or sockets of the eyes, the nose, &c.

3. The NASAL-BONE is almost a long four sided figure, situate below the forehead, and makes with its fellow the upper part of the nose.

They form that kind of arch which serves to sustain such injuries, as the nose is most exposed to. The

Of the Bones of the Head.

5

The NAIL-BONE is a small thin one, situate in the great angle of the orbit, and is connected with other adjacent bones. It serves to compleat the internal sides of the orbit, to cover the fore-part of the labyrinth of the nose, and to form the lachrymal canal. 4.

The PALATE-BONE, with its partner, make the back part of the roof of the mouth, and a small part of the bottom of each orbit. 5.

The INFERIOR-SHELL is, with its partner, situate in the nasal canal, immediately above the holes of the lachrymal canals. They are connected with the neighbouring bones, and serve to compleat the bony structure of the nose, increase its surface, and render it proportionable to the extent of the organ of smell. 6.

The PLOUGH-SHARE, or last bone, is situate in the middle of the lower part of the nose, and connected with several other bones. It serves to form the hind part of the partition of the nostrils. Δ.

The LOWER-JAW is only one bone in adults, two in children, and is connected with the temple-bones. 8.

Both jaws are furnished with *Teeth*, which are sometimes fourteen, sometimes fifteen, and sometimes sixteen in each jaw.

They are of three sorts, and appear at different times.

1. The CUTTING-TEETH, so called from their proper use in cutting the food, are the four foremost in each jaw; they appear first as being thinnest and sharpest; each of which is riveted in its cavity by a single pointed root. a a a a

2. The DOG-TEETH are one on each side of the cutters, and are deeply fixed in their sockets by a single root. They serve to pierce the harder kinds of food. b b

3. The GRINDERS are the rest of the teeth, and so called, because they serve as so many mills to grind the food. They are generally five in each side of the jaw, and have two, three, or four roots. c c c c c

The TONGUE-BONE is a small one, resembling a small bow, situate in the middle space between the angles of the lower jaw. It serves as a solid beam for the muscles to act with, in raising or depressing the tongue and wind-pipe. g g g

SECT.

SECT. III.

Of the Bones of the TRUNK.

Cases I M O
 N^o I. **T**HE bones of the trunk are those which compose the spine, bason, and the chest, the spine consists of twenty-four bones, besides the sacred and rump-bones; SEVEN of which belong to the neck, TWELVE to the back, and FIVE to the loins. They lie not all in a straight line; those of the neck bend inward; those of the back outward, for enlarging the cavity of the breast; those of the loins bend inward, and those of the sacred bone outward, for enlarging the cavity of the bason. Each bone is composed of a body, and seven eminences. The fore part of the body is round and convex, the hind part somewhat hollow; its upper and lower sides are cover'd with a cartilage or gristle, which is pretty thick forward, but thin backward, by means whereof it is, that we bend the body forward, the gristles yielding to the pressure of the bones.

The eminences of each bone are of three sorts; two lateral, one on each side; four crooked, two above, and two below, by these the bones are joined to each other; and one sharp on the hind part of the bone. The eminences, with the concave part of the body of the bone, form a large hole in the body of each bone; and all these holes, answering one another, make a canal for the descent of the spinal marrow, which sends out its nerves to several parts of the body by pairs, through two small holes between each superior and inferior bone.

The bones of the neck differ from the rest in being smaller, harder, their lateral eminences perforated for the passage of the blood vessels, and their sharp eminences forked and straight.

Cases I M O
 N^o I. 2. **T**he SACRED BONE in children consists of several bones, which are so united together, as to make one large, broad, and solid bone in adults, in form of a three sided figure, whose base is joined to the last bone

Of the Bones of the Trunk.

7

bone of the loins, the upper part of its sides to the haunch-bone, and its inferior extremity to the rump-bone. It has five holes on each side, but the nerves pass only through the five on the fore-side.

This bone is the common base and support of the trunk of the body, guards the nerves proceeding from the extremity of the spinal marrow, defends the back part of the basin, and affords a sufficient origin to the muscles which move the trunk and thigh.

The RUMP-BONE consists of four pieces, the upper of which is joined to the sacred bone, and the lower ends in a small gristle. It is also joined to the hip-bone by a STRONG LIGAMENT.

Cases I M O
N^O I.
V
Case O N^O I
Z Z

This Bone serves to sustain the end of the straight gut: it yields to the pressure of the fetus in women in travail, and midwives use to thrust it backward; but sometimes rudely and violently, which occasions great pain, and several bad effects. *Daventer* has put a large share of the art of midwifery on the right management of this bone, and boasts of the rules he has laid down for that operation, as one of the the greatest discoveries he has made.

The SPINE, taken all together, is the support of all the other bones, and the universal director of all the attitudes necessary for their different motions; to give a machine both these advantages, it must have two properties, strength and pliability, and it will be still more perfect, if it be light in proportion to its bulk. The wise author of nature has framed the spine with these advantages, in a manner which is more wonderful, because most simple. He has made the spine flexible, by the number of pieces of which it is composed; he has made it firm and strong by disposing these pieces, so as naturally to support and sustain each other, and by framing them in the most convenient manner for that infinite number of cords by which they are tied together; and lastly, their internal structure renders them very light.

The NAMELESS-BONES are situate on each side the sacred bone, and, when consider'd separate, have no regular figure, being of different breadths in different parts,

Of the Bones of the Trunk.

parts, unequally convex on the outside, and unequally concave on the inside. Each nameless bone in children consists of three distinct pieces, which unite and make but one bone in adults.

Cases ABCE The first is the HAUNCH-BONE, whose figure is
 M O N^o I. X almost a half round, and is considerably larger in wo-
 G men than in men, for the sake of child-bearing.

Cases BCEK The second is the HIP-BONE, which has a large ca-
 M O N^o I. vity for the reception of the round head of the thigh-
 X H bone, a great hole, and at its lower end a large emi-
 nence upon which we sit, and from whence the muscles
 that bend the thigh arise.

Cases ABCE The third is the SHARE-BONE, which uniting with
 F K L M O its fellow on the other side, by an intervening gristle,
 N^o I, 2. forms the fore-part of the bason.

I The nameless bones, with the sacred bone, form
 the bason, which is a part of the cavity of the belly;
 especially those which are the common sewers of the
 urine and gross excrements, and those by which the two
 sexes are distinguished. The bason is larger in women
 than in men; the haunch and hip-bones are wider.

These bones, with the sacred bone, support the whole
 trunk, all the parts belonging to it, and the lower ex-
 tremities. In short they are the base of the whole
 body, and the general center of all its motions, when
 standing, sitting, or lying.

From the bason we ascend again to the chest, which
 is made up by the bending of the ribs and breast-bone.

Cases B C E The RIBS are twelve on each side, joined to the twelve
 W X joints or bones of the back; they are nearly round, and
 grow flat and broad as they approach the breast-bone,
 into which most of them are fix'd by a gristly extremity.
 Each rib has a small canal in its under side, in which lie
 I 2 3 4 5 6 7 a nerve, vein, and artery. The ribs, viz. the SEVEN
 upper are fastened to the breast-bone, and are called

I 2 3 4 5 the TRUE RIBS; the other FIVE, the FALSE,
 or SPURIOUS RIBS; because they are shorter and
 softer, and have their gristly ends joined to each other
 below, thereby leaving greater space for the dilatation
 of the stomach and entrails.

The

Of the Bones of the upper Extremities.

9

The BREAST BONE is a long flat one representing a dagger, at the lower extremity of which is a GRISTLE like a sword point. It is made up of three, and sometimes more bones; and to it, as has been mentioned, the true ribs are fixed.

Cafes B C E
F P W X
A A A
X

The ribs, when joined behind and before, form a cavity capable of expansion and contraction, in which are chiefly contained the organs of respiration, and those of the circulation of the blood.

The breast bone serves to defend the heart, and receive the extremities of the ribs.

SECT. IV.

Of the Bones of the upper Extremities.

THE SHOULDER OR BLADE BONE, is almost of a three sided figure, situate at the upper and back part of the chest, from about the first, down to the seventh rib. Its parts are a SHALLOW CAVITY, to receive the head of the arm-bone; and a LARGE SPINE OR RIDGE, from whose fore-part arise two PROCESSES tied to each other by a STRONG BAND, for enlarging the cavity to keep the head of the arm-bone.

Cafes B C E
K W X
C
*
c
b a
z

This bone serves to facilitate the motions of the arm, to give insertion to a great many muscles, and as a shield to defend the parts of the chest.

The two COLLAR BONES, each resembling, in some measure, an *Italick f*, are situate transversely, and a little obliquely, opposite to each other, at the upper and fore part of the chest, between the breast and blade bones, with which they are connected. These bones serve for buttresses to the blade bone, and bound their motions forward and upward; they likewise hinder the blade bone from running too far back, which might

Cafes A B C
E K N W X
B

Of the Bones of the upper Extremities.

might happen in those who drag burdens behind them,
 ୧୭୮.

Cases BCEX The ARM BONE is a long and almost round bone, thick at one end, and broad at the other. It is joined above with the cavity of the blade-bone, and below with the two bones of the fore-arm. The uses of this bone are sufficiently known, therefore we need not spend time in describing them.

The FORE-ARM consists of two long bones, *viz.*

Cases B C E The ELL-BONE, so called from its being used as
F a measure, is the longest of the two bones, and is irregularly three sided, diminishing in thickness, from one end to the other. It is joined above with the inferior extremity of the arm-bone, with the two extremities of the next bone, and with the hand.

Cases B C E The **SPOKE LIKE BONE**, so termed from the resemblance it has to the spoke of a wheel, is nearly of the same length with the former, bigger at one end than the other, and situate along the side of the **Ell bone**. It is connected with the **Ell bone** at its two extremities, and sideways by a **STRONG LIGAMENT**, with the **Arm bone** above, and below with the wrist.

Cases D E

I 2 3 4 5 6
7 8

The WRIST is composed of EIGHT BONES of an irregular figure, which are distinguished into four of the first rank, and four of the second rank. The two first of the first rank are joined with the spoke like bone; the first of the second rank is joined to the thumb, and the remaining three to the bones of the back of the hand. The wrist is as a base to the hand, in protecting its tendons, and allowing a free large motion.

Cases BCE The **BACK** of the hand consists of **FOUR BONES**,
 f f f f which sustain the fingers. These bones, by their
 length, make the hand very capacious; by their fore
 concavity, form the hollow of the palm of the hand,
 which may be increased at pleasure, by the motion of
 the more external of these bones forward.

g g g g g The THUMB and FOUR FINGERS are each com-
h h h h h posed of three bones; as for their figure and connexion
i i i i i with one another, you will have a better idea of them,
by

Of the Bones of the upper Extremities.

11

by looking upon the several figures they are referred to, than can be given by a verbal description.

The ADVANTAGES we acquire by our superior extremities, and their several parts, are so evident in all the common actions of life, that they must, on the first reflection, occur to the meanest capacity; and therefore, without farther mentioning them, I shall proceed to the last part of the Skeleton.

S E C T. V.

Of the Bones of the lower Extremities.

THE THIGH-BONE is the longest and biggest bone of the Skeleton. Its figure comes near to that of a cylinder, and is a little bent in the middle. Its upper end has a ROUND HEAD, which is received into the CAVITY of the nameless bone; a small distance below this, are two processes, namely, the GREATER and LESS. The space between the greater process and the head of the bone is called the NECK; and from the lesser, down the back part of this bone till within four or five inches of its lower end, is a RIDGE, which serves for strengthening the bone, and the insertion of some muscles.

Cafes BCE
L M O X
K

R

m n
o

At the lower end of this bone are TWO HEADS. It is joined below with the great bone of the leg, of which more hereafter.

p p

The KNEE-PAN, resembling a large chestnut, is situate above the ridge of the great bone of the leg, and connected with this bone by a STRONG BAND, and with the thigh-bone by the tendons of several muscles. Its chief use is to hinder the leg from being bent forward in extension, which would certainly be the case in this articulation did not this bone, like a bolster, check its rolling forward. In a straight posture, when one foot is set forward, the whole weight of the body bears on the knee-pan, which in this situation hinders the knee from bending

Cafes B C E X
L

C 2

back-

Of the Bones of the lower Extremities.

backward, and straining the muscles that bend it behind.

Cases A B The SHIN or GREAT-BONE of the leg is a
C E X long large one, much bigger at the top than below. It
M is connected above with the thigh-bone, and below
q with the head of the ancle-bone. At its lower end is
a REMARKABLE PROCESS, which forms the inner
angle.

Cases B C The SECOND BONE of the leg is a long small
E X bone, lying on the outside of the great one. It is fixed
N above, to the external side of the great bone, at a
r small distance under its joint, and sidewise by a STRONG
BROAD BAND. The LOWER EXTREMITY of
this bone makes the outer ancle and a part of that
joint. It chiefly serves for the origins of several mus-
cles; but has no share in supporting the body.

1 2 3 4 5 6 7 The INSTEP consists of seven bones, which have
the same kind of elastic structure with those of the
wrist, and for the same ends, but in a much greater
degree, because here the whole body is sustained. This
kind of contrivance and its use are evident in the last
joints or pasterns of horses legs, for horses that have
long pasterns, and much elastic motion in them, must
trot high and easy, but a horse, with short pasterns,
that trots high, always trots hard.

The UPPER PART of the FOOT is composed of
S S S S S FIVE BONES, like those of the back of the hand,
and are joined to the bones of the TOES, which are
t t t t t in all FOURTEEN. The GREAT TOE having TWO,
v v v v v and the rest THREE apiece, which are all almost like the
x x x x x bones of the fingers; but, as has been said of the fingers,
you will have a better idea of their form and connection
from the figures, than I can attempt to give by words.

The general uses of the lower extremities are suf-
ficiently evident, therefore need no explanation.

Of SARCOLOGY ; *or* the Doctrine of the Soft Parts.

CHAP. II.

Of the COMMON COVERINGS.

THE body is invested by three common and universal coverings ; the scarf-skin, the skin, and the adipose membrane or fat covering, but these may be reduced to two, for the scarf-skin is only a part of the true skin.

The substance of the SCARF-SKIN consists of very minute scales, is solid and compact, but capable of being extended and thickened, as we see by steeping in water, by blisters raised on the skin, &c. Its origin is as obscure as its regeneration is evident, sudden, and surprising, for let it be destroyed ever so often, it still grows again.

This covering serves to defend the skin from the painful impressions of hard bodies, to modify the sense of feeling, to moderate the excretion of the skin, &c.

The SKIN, or *second universal covering of the body* is made up of several sorts of tendinous, membranous, vascular, and nervous fibres or threads, the intertexture of which is so much the more wonderful, as it is difficult to unfold ; for their directions are as various as those of the stuff of a hat.

The skin serves to wrap up and defend the subjacent parts, to be the organ of the sense of feeling, the universal emunctory of the blood, by discharging the matter of perspiration, sweat, &c.

The

Cases A B The ADIPOSE or FAT COVERING consists
 D F G H of a great number of membranous folds, irregularly
 K I-P W X joined to each other at different distances, so as to form
 MO N^o 3 numerous vacuities of different capacities, which com-
 municate with each other, and are filled with an oily
 juice, more or less liquid, called FAT. The different
 consistence of which depends on the size, extent,
 and subdivision of the cells.

A A &c.

The fat chiefly serves to blunt and sweeten the acrimony of the salts of the blood, to preserve the flexibility of the skin, muscles, and other parts necessary for their actions, to prevent or lessen their mutual frictions, &c.

The NAILS are composed of several planes arising from the scarf-skin, sodered together, which are nearly of an equal thickness, but of different lengths. They chiefly serve to strengthen the ends of the fingers and toes, and hinder them from being inverted toward the convex side of the hand or foot, when we handle or press upon any thing hard. For in the hand the the strongest and most frequent impressions are made upon the side of the palm, and in the foot, on the sole; therefore the nails serve rather for buttresses than shields.

The HAIRS belong as much to the coverings as the nails. They are a kind of reeds or rushes, the roots of which lie toward that side of the skin next the body. The beginning of the stem pierces the skin, and the rest of the stem advances beyond the outer surface of the skin, to a certain distance, which is different in different parts of body.

The use of the hairs, with respect to the human body in general, is not sufficiently known, however they serve for a covering and ornament. Whatever the efficient cause may be, why a man has a beard, and a woman none, is not yet clearly accounted for; but it is certain, that the final cause is for distinguishing the male from the female sex.

Besides these coverings already described, the antient Anatomists reckoned two others, the fleshy membrane, the common covering of the muscles.

The

The FLESHY MEMBRANE lies in beasts, between the skin and fat, by which they move the skin, and drive away flies, &c. but in human bodies it is no where to be found, except in the face, because reasonable creatures, being furnished with hands and cloaths, do not want it.

The COMMON MEMBRANE OF THE MUSCLES, lying under the fat, is not an universal covering, but particular expansions of the membranes of some muscles, or the tendinous expansions from others.

CH A P. III.

Of the Abdomen, or Lower Belly.

SECT. I.

Of the Muscles of the lower Belly.

THE OBLIQUE DESCENDING MUSCLE arises from the eight lower ribs near their extremities, and terminates in the upper part of the ridge of the haunch bone, in the share bone, and WHITE LINE, which is extended from the breast-bone along the middle of the lower belly to the share-bone; and is made of the tendons of the Abdominal muscles, in the middle of which is the NAVEL.

Cases A B D
FGHLPW
O N^o 3

*I *I

The OBLIQUE ASCENDING MUSCLE arises from the edge of the haunch bone, also from the share bone; and terminates partly in the lower edge of the false ribs, and partly at the white line.

*2 *2

The PYRAMIDAL MUSCLE arises from the middle of the fore-part of the share-bone, and terminates at the

*3 *3

Of the Peritonæum and Omentum or Cawl.

the union of the transverse muscles; between the straight muscles a little below the navel.

*4 *4

The STRAIGHT MUSCLE arises from the share-bone, and terminates in the breast-bone, and several ribs.

*5 *5

The TRANSVERSE MUSCLE arises from the transverse processes of the bones of the loins; from the inner edge of the haunch-bone; and from the endings of all the ribs below the breast-bone; it terminates in the cartilage, or gristle, at the end of the breast-bone, and white line.

These five pair of muscles serve to contain and defend the contents of the lower belly; to assist by it their constant motion, digestion, and the progress of the chyle; to expel the fæces, urine, foetus, and after-birth in time of delivery; to assist respiration, and the bending of the body; to facilitate vomiting, &c.

S E C T. II.

Of the Peritonæum and Omentum or Cawl.

Case B
A

THE PERITONÆUM is a thin soft membranous bag, which lines the whole cavity of the lower belly, and contains most of its contents. Its upper part covers and adheres to the midriff; fore-part to the transverse muscles, and the white line; lower part to the share-bone; and back part to the sacred bone, and bones of the loins. It contains in its external, or rather cellular substance, the umbilical vessels, the bladder, urinary canals, kidneys, and spermatick or seed vessels.

The cellular substance has several productions; two of which invest the spermatic ropes in men, and the round ligaments, or bands of the womb, in women. There are other two which involve the crural vessels, and are gradually lost in their course downward. The use of this bag appears very plain, from what has been said of it.

Case B
Ω

The CAWL is a fine covering, larded with fat, somewhat like net work, situate on the surface

face of the gut, and resembles an apron tucked up. Its upper part is connected to the bottom of the stomach, the spleen, and to a part of the first of the small guts; thence descending a little lower than the navel, is reflected and tied to the first of the great guts, the spleen, and to part of the first of the small guts.

It serves to assist the motion of the guts by its slipperiness, defend them from cold, assist the preparation of the bile, allay the sharpness of humours, and perhaps to supply nourishment where a deficiency happens, &c.

SECT. III.

Of the Gullet and Stomach.

TH^{O'} the *Gullet* and *Thoracic Duct* are situate in the chest, yet intending to shew the course of the aliments from the mouth to blood, I shall therefore describe them both in this chapter.

The GULLET is a long, large, and round canal, Cases A I K descending from the mouth between the wind-pipe and the joints of the neck and back, down to the lower part of the chest; from whence it passes into the belly, through a particular hole of the midriff, and ends at the upper orifice of the stomach. It is made up of several coats. The first coat, while in the chest, is formed by the duplicature of the posterior part of the mediastinum; the second, being made of several layers of fleshy fibres, contracts the gullet; the third is nervous; and the fourth, or innermost coat, is cellular, and covered with a slimy humour to facilitate the descent of the aliments. Φ

The use of this canal appears pretty plain from what has been said of it; that is, to convey the aliments from the mouth into

The STOMACH, or reservoir of the food, which resembles almost a bag-pipe in figure, and is chiefly situate in the left side immediately under the midriff; the liver covers

D

part

I

Cases ACEF
I K P W X
O N^o 3.

Of the Intestines and Mesentery.

part of its right side, the spleen touches it on the left, and the colon, or second great gut, at the bottom, to which the cawl is also tied. It has two openings; the

- 2 3 FIRST is a continuation of the gullet, the OTHER joins the intestinal canal, and goes by the name *Py-lorus*, which signifies a porter, where there is a particular valve serving to contract this opening.

The stomach is made up of four coats; the outer, or common, is from the peritonæum; the second is muscular, consisting of several planes of fleshy fibres, which serve to contract it; the third is the nervous coat, which is again divided into a fourth, called the villous coat.

The manner, in which digestion is performed, has been, and still continues to be matter of great controversy; therefore being obliged to accommodate this essay to every one's capacity, I shall lay aside, at present, philosophical enquiries concerning this subject, and only say, that the stomach serves to receive, contain, dissolve, and expel the aliments thro' the lower, or right orifice, into the INTESTINES.

S E C T. IV.

Of the Intestines and Mesentery.

Cases ABCE THE INTESTINES are a large membran-
F F G H ous canal, extended from the stomach to the fun-
P II W X. dament, and divided into six portions; the three first
M & O N^o 3. are called the *small guts*, and the latter three the *great guts*.

Cases C I 5 The *first* of the former three is termed DUODENUM,
E X 9 K 12. because it is commonly reckoned in adults to be about twelve inches long; it takes its rise from the right, or lower opening of the stomach, and runs first straight down, then a-cross, from the right part of the belly, toward the left kidney.

Cases C II. At a small distance from the right orifice of the sto-
K 8 X 6. M N^o mach, the COMMON GALL DUCT and the PAN-
2, 8 O N^o 3, 8. CREATIC

CREATIC DUCT open into it; from the one Cafes C 13, E 10, F K P it receives the bile, and from the other the 0 X 8. pancreatic juice.

The *second* is named JEJUNUM, because Cafes C 16, E 11, H 6, generally found empty on account of the K 13. fluidity of the chyle, the sharpness of the bile, and the great number of lacteal vessels. It has a great many valves and wrinkles within. It begins where the duodenum ends, and terminates where these valves disappear.

The *third* is called ILEUM, because of Cafes C 16, E 12, its situation near the haunch bones, termed G H 7, K 14, X 10. *Iliac*; it begins where the valves are not O N° 3, 13. visible, and terminates where the thick guts take their rise.

The *first* of the great guts is called Cafes C 17, E 13, F W CÆCUM, which is only a short, round, X 11, G H 8, K 15, broad bag, about three or four fingers O N° 3, 14. breadth long, with an APPENDIX, or worm-Cafes E K 2 W X 12. like process, and a continuation of the O N° 3. 2 second called

The COLON, which is the most con-Cafes C 18, E 15, F 12, siderable of all the guts. It has three liga-G H 9, K W X 16. mentary bands, and passes in form of an O N° 3, 16. arch under part of the liver, and bottom of the stomach, to the lower part of the left side, till it comes to the straight gut. Where the cæcum joins the colon, one part of the circumference of both is depressed, and forms on the inside a large fold, called the VALVE of the colon, which advances Cafes X 14, O N° 3, 15. into the cavity of the gut.

The RECTUM, or *straight gut*, which Cafes A K 17, C 19, goes straight down to the fundament, has E 2, P 16, F 13, W 14. three muscles, one composed of circular D N° 2, 33, O N° 1, 2. fibres called the SPHINCTER, which sur-Cafes A 17, C D E 18, K X rounds the lower extremity, and serves to W 15. O N° 1, 2, 17, shut its passage; the other two are called D N° 2, 35. the LEVATORS, because they serve to pull Cafes A 18, C E K 41, the extremity upwards. O N° 1, 2, 18, D N° 2, 34.

D 2

The

Of the Liver and Gall-Bladder.

The structure of the intestines is pretty much the same with the stomach. All the guts lie in a little space, and are kept from entangling one another by the **MESENTERY**, which is a fat membrane, placed in the middle of the belly, almost of a circular figure with a narrow production, to which the end of the colon and beginning of the straight gut are tied. It is generally reckoned to be about three or four inches in breadth, and three ells in length, to which the intestines, generally reckoned about eight or nine ells long, are tied; so that to every inch of the mesentery, there are three inches of the guts fastened. The mesentery is strongly tied to the first three joints of the loins.

S E C T. V.

Of the Liver and Gall-Bladder.

THE LIVER is a large pretty solid mass, of a dark red colour, immediately situate under the midriff, chiefly in the right side, and somewhat in the left above the stomach. Its upper side is convex, and under concave; backward towards the ribs it is thick, and its fore-part, where it covers the stomach and part of the guts, is thin. The liver adheres to the midriff, it is also tied to it and the breast bone by a thin band, which sustains and keeps it in an erect posture; and to the navel by a **ROUND BAND**, which prevents it, while lying down, from rushing upon the midriff. Both bands serve likewise to suspend it, while lying on the back, from bearing too much upon the great subjacent blood vessel, called the cava, which might thereby press the sides of the vessel together, so stop the circulation of the blood, and put a period to life.

The vessels of the liver are the **VENA CAVA** and **VENA PORTÆ**, accompanied with many small branches of arteries, which come from the celiac and upper mesenteric. The **VENA PORTÆ** and **CAVA** * enter the liver by its concave side, and are equally distributed through its whole substance; wherever there is a branch

branch of the one, there is a branch of the other. The vena portæ brings the blood full of bile for secretion, and the vena cava carries back the remaining blood. *See in Case C a most beautiful analysis of the vessels of the liver.*

The GALL-BLADDER is a small bag, Cases A E K W 3, B 4, shaped like a pear, and is fixed to the C 9, F 7, P X 5. concave side of the liver, into which its M O N^o 2, 3. back part makes a small dent. From the gall-bladder, towards that part of the gut joining the stomach, runs a small canal, called the CYSTIC DUCT; and from the Cases A K C 10. liver to this duct runs another, named the M O N^o 2, 3, 6. HEPATIC DUCT, both which unite in one, Cases A K 7, C 8. and form the COMMON DUCT * that en- M O N^o 2, 3, 7. ters the first small gut obliquely, at a small * Cases C 11, K 8, X 6. distance from the stomach. The liver M O N^o 2, 3, 8. serves to secrete the bile from the blood, and the gall-bladder to correct, refine, and keep it till a proper season calls for its discharge into the intestines. The bile serves to thin the chyle, unite the oily and watry parts together, to stimulate the intestines, and in some measure to change the acidity of the chyle.

SECT. VI.

Of the Pancreas and Spleen.

THE PANCREAS, or SWEET-BREAD, is Cases C 12, a long flat compound gland, resembling in figure, E X 7, F 9, when extended, a dog's tongue; it is situate under the K P 10, stomach between the liver and the spleen, and has W 18. a canal about the bigness of a crow's quill, called the PANCREATIC DUCT, composed of many smaller, Cases C 13, running along its middle, and entering the duodenum, E 10, F K or first small gut, along with the common gall-duct. P 9 X 8. The sweet-bread serves to collect a liquor called the PANCREATIC JUICE, which is of the same nature with the spittle; it assists in compleating the digestion of the aliment, and fitting it for entering the lacteals.

The

Of the Lacteal and Lymphatic Vessels.

Cases A 12, C 20, EF 8, The SPLEEN, or MELT, is a bluish
K 11, P 13, W 4, X 15. mass of a long oval figure, situate on the
O N^o 3, 3. left side under the midriff, between the
ribs and the stomach above the left kidney,
and is tied to the peritonæum, midriff, cawl,

Cases A 13, C 21, E a and left kidney. It has ARTERIES from
F B K c W 6, X 18. the celial, and its veins, after they come

Cases A 14, C 22, E b out, unite and make the SPLENIC BRANCH
F c K b W 7, X 17. of the vena portæ.

The spleen serves to furnish the liver with
thin blood, that the remaining thick mass, flowing
from other parts into this gross viscus, from which
the bile is to be secreted, may be render'd more fluid,
and thereby the secretion of the bile more advanta-
geously performed.

S E C T. VII.

Of the Lacteal and Lymphatic Vessels.

Cases A 15, **T**HE LACTEAL VESSELS are a great num-
16, M N^o 3, ber of fine pellucid tubes, beginning from the
31. small guts, and proceeding thence through the me-
senteric; they often unite and form fewer and larger

See the above vessels which first pass thro' the MESENTERIC
Cases and Figures. GLANDS, and thence to

Cases A β The RECEPTACLE OF THE CHYLE,
K 19. C N^o which is a membranous bag, almost of the shape of
2, β. a pear, about two thirds of an inch long, and one third
over in its largest part, when collapsed; it is situate
on the first joint of the loins to the right of the great
artery, a little higher than the blood vessels of the
right kidney, and is formed by the union of three
canals; one under the great artery, another from the
interstice of the great artery and vein, and the third
from under the blood vessels of the right kidney. This
bag, at its upper part decreasing gradually in breadth,
is contracted into a slender membranous thin trans-
parent canal, known by the name of

The THORACIC DUCT, or CANAL, which runs Casus K 1 along the spine of the back, between the azygic vein and C N^o 2. 1 the great artery, to the fifth joint of the back, or higher; from thence it passes behind the great artery towards the left, and ascends behind the left collar vein, where it terminates in some subjects by a small canal, in others by several branches united together, and opens into the backside of the collar vein, near the outside of the internal jugular.

The lacteals serve to receive the fluid part of the digested aliment, called the chyle, and convey it to the receptacle of the chyle; from thence it is carried along the thoracic duct, afterwards into the left collar vein, where it mixes, and circulates along with the blood.

The LYMPHATIC VESSELS are small fine canals, arising invifible from the extremities of the arteries throughout the whole body, but more plentifully in the glands than other parts, and in greatest number from those masses which separate the thickest fluids, as may be observed in the LIVER, SPLEEN, &c. Casus A 4, All that rise in the belly empty themselves into the lacteals 12, K 4. and receptacle of the chyle; those in the cavity of the chest, into the thoracic duct and collar veins. These vessels serve to carry the lymph for thinning the chyle, and making it mix more readily with the blood, and to carry off so much lymph as is fit for leaving the blood of a proper fluidity to flow through the veins.

S E C T. VIII.

Of the Urinary Parts and Renal Glands.

THE URINARY PARTS are the kidneys, with their vessels and bladder of urine. The KIDNIES are two red bodies, Casus A W 23, 24, C 35, representing in figure a long oval, situate 28, E 22, I 3, K 20, L 1, towards the upper part of the loins, upon P 18, X 31. D N^o 1 the two last ribs, the right under the liver, & 2, 15, O N^o 3, 18.

and

Cases A 24, L 1.

Cases

A 21, C 27, E 20, K f W by the EMULGENT ARTERIES; and what 22. D N° 1, 16, D N° 2, 25. remains, after the secretion or separation, is Cases A 22, C 32, E 21, returned by the EMULGENT VEINS, while L 2, W 23, X 28. the secreted urine is carried off to the bladder through D N° 2, 26.

Cases A 26, C 36, E 24, The URETERS, or URINARY CANALS, which are two about the bigness K 22, L 3, P 19, W 25, NALS, of a goose-quill, arising in the hollow side X 32. D N° 1, 2, 16, 29, of the kidney, where, being enlarged like O N° 2, 3. a funnel, they form the bason, of which

already; and, descending like a long *f* to the lower side part of the bladder, run obliquely for some space between its coats, and terminate there by narrow orifices, by which they prevent the return of the urine.

They serve, as has been above hinted, to receive the urine from the kidneys, and convey it to

Cases A 27, C 37, E 25, The BLADDER, which is a kind of K 23, L 4, P 20, W 26, a membranous fleshy pouch, or bag, X 33. D N° 2, 30, situate in the lower part of the belly, immediately behind the union of the share-bones, above the straight gut, in men, and O N° 1, 2, 3. the neck of the womb in women. Its figure is nearly

that of a short oval, and its coats are almost like those of the stomach and guts, and serve the same uses.

At the bottom of the bladder is a ligamentary rope, called URACHUS, which is in Cases B 7, F P z D N° part originally a production of the inner 2, 32, O N° 3, 29. coats of the bladder, running up between the peritonæum and the white-line of the belly, all the way to the navel. It has a particular use in the foetus, as shall be shewn in another place, and is composed of two others, which are the extremities of the UMBILICAL ARTERIES

Cases B F a K 38.

O N° 3, a D N° 2, 31. that run up the sides of the bladder, and join it at the navel. Around its neck, which

which is longer in men than in women, goes a small muscle that contracts its orifice, and thereby prevents the involuntary efflux of the urine.

The bladder serves to collect the urine from the kidneys and ureters, afterwards to discharge it thro' a cylindrical canal adjoining its neck, of which more in describing the yard.

The RENAL GLANDS, or DEPUTY KID- Cafes A 25, NIES, are one on each side, situate immediately C 34, E 23, above the kidney, of no certain figure, nor do we K 21. D N° yet know their use, but they are always described I, 2, 14, 27. with the urinary parts, on account of their situation.

Their BLOOD-VESSELS sometimes come from the Cafes A D great artery and vein, and sometimes from the emulgents. a b

SECT. IX.

*Of the Parts of Generation in Men,
which are the Testicles and Yard, with
their Vessels, &c.*

THE TESTICLES are two oval bo- Cafes A 30, 32, B 11, 14, dies, about the bigness of a pidgeon's C 40, E 28, 30, K 26, 28, egg, situate without the belly below the O N° 2, 23. interstice, between the groins, and are contained in a common bag called the SCROTUM, which is made up of the scarf Cafes E 40, O N° 2, 21. skin, skin, and a thin muscle called DARTOS, See the inside of fig. 40. whereby the scrotum is often wrinkled. This muscle, by the disposition of its fibres, forms two small bags joined sideways to each other, by which union a partition is made between the testicles. Each testicle has a MUSCLE, Cafes A 31, B 12, 15, called CREMASTER, that serves to lift it E 29, K 27. up; and two coats, the external, called the VAGINAL coat, from its resemblance to Cafes C 39, K 26. a seath; and the internal, that immediately covers the testicle, is named the WHITE one, Cafes K y, O N° 22, on account of its colour. The testicles receive each an artery from the great artery, a
E little

Cafes A 28, B 13, C 38, E 26, K 24. little below the emulgent arteries, called the SPERMATIC, or seed artery, which, unlike all other arteries, rise small, and increase in their progress, that the motion of the blood may be sufficiently abated, for the secretion of so thick a fluid as the

Cafes A 29, C 38, E 27, K 25. feed. They have veins, called also SPERMATIC; the right arising from the cava, or great vein, below the emulgent vein, and the left from the left emulgent vein.

Upon the upper part of the testicles are two bodies, in form of a silk-worm, called EPIDIDIMI, which are the beginnings of

Cafes A 33, C 41, E 31, K 29, O N^o 2, 24. The EJACULATORY VESSELS, which are two strong whitish canals about the thickness of a straw; they pass from the epididimi of the testicles, along with the blood vessels, till they have enter'd the muscles of the belly, and then pass under the peritonæum directly through the bason, to the inferior part of

Cafes A 35, E 33, K 31, O N^o 1, 2, 31. The SEMINAL VESSELS, which are two soft whitish knotted bodies, about three or four fingers breadth in length, and one in breadth. They are obliquely situate between the straight gut, and lower part of the bladder, in such a manner, as that their superior extremities are at a distance from each other, and their lower extremities are united between those of the ejaculatory vessels. These vessels open into the canal of the yard by a DOUBLE ORIFICE.

Cafes E 34, K 32, O N^o 1, 2, 32. The PROSTATATA is a body almost of the shape of a heart, situate before the neck of the bladder, with its base towards the bladder, and point towards the canal of the yard. It separates a limpid humour which is carried into the canal of the yard, by several small CANALS that open there; this liquor seems designed to be mixed with the seed in time of coition, for making it flow more easily. But the chief, and more particular use hereof, appears to be this, that, upon a titillation of the nut, the fleshy fibres of the prostatica, having a very near situation thereto, and its fleshy coats are thereby contracted, likewise the liquor there contained,

contained, violently affecting the sensible membrane of the urethra, it draws the feminal bladders more exquisitely into a consent, being nearer to them, and thus encourages the expulsion of the seed; which, the membrane of the testicles being also contracted, drives on a successive supply.

The YARD is the chief instrument Cases A 36, B 16, C 43, belonging to the parts of generation, whose E 38, K 34, O N° 1, 2, shape and dimensions are pretty well known, 33.

therefore needs no description. It begins with TWO BODIES from the hip bones, Cases O N° 1, 2, 33. which unite under the share bones, and are there strongly connected by a LIGA- Cases B 18, O N° 1, 2, MENT, or BAND. In its under part is 35. a canal from the bladder, called URETHRA,

thro' which pass the urine and seed; its fore-part is called the NUT; the Cases E 37, K 36. loose skin covering it, the FORE-SKIN; and Case E 39. the straight part of that skin, on the under side, the bridle.

The URETHRA is lined with a mem- Cases E 36, K 35, O N° brane full of glands, that separates a slimy 1, 2, 34. humour to defend it from the sharpness of the urine. There are three large GLANDS Cases E 35, K 33. in the urinary canal, two of which are situate on its sides, and another at some distance near the glands. The inner substance of the yard is spongy, and divided by a PARTITION into two CAVERNOUS BODIES. See the above cases and figures.

On its upper side are two ARTERIES, Cases E 38, K 36. which take their beginnings from the umbilical arteries; and one VEIN, which runs Cases A 37, B 19, E 38. back to the iliac veins; likewise two NERVES from the sacred bone, with several lymphatic vessels. The yard has TWO PAIR OF MUSCLES, the first called the ERECTOR, from its use in pulling up the yard toward the share bones, Cases A 38, E 41, K 40, O N° 1. by which the great vein is compressed, and

E 2

the

Of the Parts of Generation in Men.

the returning blood denied a passage under those bones, by which the yard is erected. The second is called *Cases A 39, K 42, O N^o 1, 2, 41.* *ACCELERATOR*, from its use in compressing the bulb of the urinary canal, and driving the blood more towards the nut for its distention. Having now considered the parts of generation, I will next attempt to shew a little their *USES*, as to the seed.

The blood, being received in a small quantity, by the spermatic artery, moving slowly, being retarded and deprived of its thick red part by canals opening into the spermatic veins, and thus becoming less red, and more slow in its motion, so as almost to stagnate in the *veins* of the testicles, from whence, after turning thicker, and *putting* on a grey colour, it is slowly drove into the epididymis, and *rather* digested by the complication and involution thereof; *it*, being almost stagnant, and well elaborated, it at last *comes* into the ejaculatory vessels, where it remains, and is again digested and elaborated, and then forced into, laid up, and preserved in the twisting cavities of the seminal vessels, or bladders, where, growing thicker and whiter, and being still further digested to the highest degree of perfection, it is called *SEED*, which is at last transmitted thro' the canal of the yard.

Hence it appears how far a man is concerned in generation, which indeed is surprising; however, before we leave this subject, it is proper to observe, that tho' minute living animals are found in the male seed, yet it does not follow, that these contain the rudiments of a future human body: the like, tho' not exactly of the same form, are observed in vinegar, pepper water, factitious liquors, &c. that are no ways concerned in any such action; nor is it so very likely that they contain the rudiments of a future body, since their large numbers would produce too plentiful an off-spring; and the eggs, in the ovaries, become useless, and want no impregnation.

SECT. X.

*Of the Parts of Generation in Women,
Some of which are external, others internal,
but all subservient to the Womb.*

The EXTERNAL PARTS are

THE CHINK, situate below the share bone, and often covered with hair, above which is a little rising made by some under the skin, called VENUS's Cases

UNT. F 17, H 10, D N^o 3, 1.
The **TWO LIPS** of the chink are only Cases F 18, H 11, skin swelled with some subjacent fat; D N^o 2, 18. these are a little separated,

NYMPHÆ appear, which are two Cases F 23, H 12, very substances, one in each side of D N^o 2, 6. resembling two pieces of flesh under a pullet's throat, and serving the conjugal pleasure, also to rise of the urine.

ITORIS is a long round Cases F 19, H 13, the bigness of a grape, situ- D N^o 2, 3, 4; 1, 2. pper part of the chink, almost under that part called the fore-

furnished with nerves, hence

The substance of the cli- f two SPONGY BODIES, Cases F 20, H 14, e those of the yard; they D N^o 2, 4, 3, 2.

part of the share-bone,

her, unite and form

the extremity,

case.

Of the Parts of Generation in Women.

Cases F 22, furnished with BLOOD VESSELS and NERVES, whose
H 16, D N^o branches run along the back of the clitoris.

2, 5, 22. The clitoris serves to excite a most exquisite sense
of titillation, and increase the venereal pleasure in the
fair sex.

Cases H 17, The URINARY CANAL is situate straight under
D N^o 2, 10, the clitoris, and discovered by a small eminence. Its
D N^o 3, 3. length is about two inches, and breadth larger than
in men. It is surrounded by a small muscle, called its
sphincter, for preventing the involuntary efflux of the
urine.

Cases D N^o The HYMEN, commonly called the MAIDEN-
3, 4. HEAD, is a thin membrane surrounding the external
orifice of the womb, which in some subjects has a ve
finall opening, in others a larger one, and, in all, m
the external orifice narrower than the rest of the
It is generally rent after the consummation of mar
and quite lost in delivery; but some irregular por
remaining afterwards, are, from their imagina
semblance to myrtle leaves, called MYRTIFO

Cafe D N^o RUNCLES. This circle, being a very thin p
2, 9. often suffers by too great a flux of t
dancing too much, walking, hard working
particular accidents; hence, in justice to
I cannot help finding fault with those
that a woman is no maid unless she has
brane preserved.

Cases L 7, The ORIFICE, or external mouth of
D N^o 2, 7. in virgins is narrow; but in married
verse.

The Internal Parts of GEN

Cases L 5, The VAGINA, or entranc
D N^o 2, 11, round strong canal, re
D N^o 4, 3. between the
mouth of
dilat

The substance of the womb is composed of several foldings of fleshy threads *, so linked together, as to form a kind of net work, with the interposition of a great number of blood vessels. It is compact and firm in those who are not with child ; but in pregnant women spongy, sinous, and capable of a large dilatation, without decreasing in thickness. It is surrounded externally by a strong membrane from the peritonæum, but in the inside, which in virgins is exceeding small, it is lined with a porous and nervous membrane, scarce visible in pregnant women.

Cases

The womb is furnished with ARTERIES F 28, 30, D N° 2, 18. and VEINS, from the hypogastrick and Cases F 27, 29, D N° spermatic vessels, which are very visible 2, 19.

in pregnant women, and communicate with the sinuses; these sinuses open into the cavity † of the bottom of the womb, and are the fountains of the menstrual discharge ‡.

The SPERMATIC or SEED VES- Cases F 31, L 10, P 22, SELS in women are four, as in men; W 30, 31, X 24, 35, they differ only in this, that they are D N° 1, 7, 12, D N° 2, shorter, and the artery makes several turn- 16, 17, O N° 3, 24.

* Betwixt the interstices of these fibres, are stretched soft yielding membranes, which, like the fibres, lie in very different planes; along are spread vast numbers of large sinuses, which have passages whereby they mutually correspond; these sinuses occasion the porosities, so much observed in cutting the substance of the womb, and are equally in the bottom and neck of the womb, but not in the great canal.

† Morgagni found this way, between the arteries, sinuses, and cavity, so very open, in a subject advanced to the ninth month of her pregnancy, that his little finger enter'd the narrowest part of it.

‡ Physicians are not yet agreed, whether the menses take their origin from the bottom of the womb, its neck, or canal. Morgagni, by repeated enquiries, has observed, that the menses equally and only flow from the bottom of the womb, and not from its neck, or canal. Hence we have sufficient reason to believe, that the lochia, or cleansings, and menses, flow from the same parts, and that it is to these parts the placenta, or womb-cake, is fix'd, which plainly shews, that these passages were chiefly designed for its service. Heister says, that he found, in two bodies, drops of blood come out of several holes in the bottom of the womb, by gently squeezing it. Littrius, Graffius, Santorini, and Schulze assert, that the menses have their source only from the bottom of the womb. Some maintain, that they have frequently seen the menses arise from its neck and canal. I am apt to think that nature may now and then vary in this affair, and sometimes make her exit by the neck of the womb, because many, during their pregnancy, have their courses regular; sometimes by the canal, and sometimes by both at once.

F

ings

ings and windings; as it descends, it divides into two branches, the smallest of which goes to the ovary; the two biggest divide into three more, one of which is bestowed upon the womb, another upon the vagina, and the third upon the bands of the womb, and the tubes. It is the same as to the VEINS.

Cases F 32, The OVARIES are two whitish oval bodies, situate L 11, P 23, on the sides of the bottom of the womb, with which W 32, X 35, they are connected by a short round band, with the D N^o 1, 19, Fallopian tubes by the broad bands of the womb, and D N^o 2, 10, with other parts by the spermatic vessels.

D N^o 4, 7, The ovary differs in magnitude, according to the age O N^o 3, 25. and temperament of the body. In those who are in their vigour, or lustful, it is very large, weighing about two drams, and often adorned with small prominent vessels; but in old women it appears dry, and full of scars, scarce weighing more than a dram.

Cases F 32, On the ovaries appear little round white vessels, L 11, P 23, called EGGS, about the bigness of a large pin-head, W 32, X 35, and full of water, which, when boil'd, resembles the D N^o 1, 19, white of an egg. These differ in number and magnitude, according to the age and temperament of the D N^o 2, 21, person. They are supposed to constitute the material D N^o 4, 7, principle of the foetus, in which its rudiments are contained O N^o 3, 25.

Cases G L 12, The FALLOPIAN TUBES are two canals, situate P 24, W 33, more or less a-cross on each side of the womb, between X 36, D N^o its bottom and the side parts of the basin.

I, 20, D N^o Each of them is fixed by its narrow extremity, to 2, 21, 22, the corner of the bottom of the womb, into which it D N^o 4, 8, 9, opens, by a canal, scarce admitting a hog's bristle; O N^o 3, 26. from thence their breadth gradually increases to the other extremity, where it is about the third of an inch. The body of the tube goes in a winding course, and their large extremity, adorned with several FLESHY FRINGES, is bent towards the ovary.

These tubes, in time of coition, are erected by a plentiful influx of blood and spirits, and by a natural motion; the free openings, with the assistance of the fleshy fringes, are applied to the ovaries, and transmit the

the prolific male seed *; afterwards they receive the impregnated egg from the ovary, and drive it forward by their worm-like motion, and at last force it into the cavity of the womb, if its course is not stopped †.

The womb serves to admit the seed, receive the impregnated egg from the ovary and fallopian tube; to contain, cherish, and nourish the fœtus for nine, or more months, and then by its fleshy force to expell it.

S E C T. XI.

Of the Fœtus in the Womb.

THE egg, when received into the womb, being round, and very small in proportion to its apartment, continues to float for some days, hence uncertain where to fix itself; but being nourished there a few days, it begins to swell, dilate, and send out fibres round its surface like any kind of grain, when thrown into the ground, by the sap of the earth. When it has arrived to such a magnitude, as to come in contact with the sides of the womb, it then loses its fibrous form at one extremity, which becomes membranous; this membranous still encreases, till it becomes vastly larger than the fibrous part, or womb-cake, though

* Some considering the closeness of the mouth of the womb, and partly the thickness of the membranes of the ovaries of the eggs, think it impossible for the seed to pass this way; therefore they suppose it to be taken up by the veins opening into the womb and its neck, where circulating, it ferments with the mass of blood; from thence come on all those symptoms which appear in conception: It enters and impregnates with the egg by small twigs of arteries, which are upon the membranes. This fermentation swells the membranes of the tubes, opens the cavity of the womb, and makes every thing ready for the reception of the egg.

† Because several eggs in their passage to the womb have been, and are frequently found stopp'd in their course by the narrowness of this canal and tube, and taken out at the age of 21 months by *Cyprian*, but the mother did not die in the operation. See his *Epistle to Dr. Millington*.

the latter was at first the largest *. The cavity of the bottom of the womb being plentifully furnished with passages, that afford the mass of blood an easy access, and the whole surface of the egg also stored with passages, by which it formerly communicated with the ovary, and other absorbents; therefore when the egg has come in contact with the sides of the womb, by its increased magnitude, the vessels of the womb and egg must also meet and unite, except those of the egg lying over the mouth of the womb; after which none of them can enlarge but in conjunction with one another. Upon this ingraftment of the egg, the passages, from the sinuses to the cavity, being shut, therefore upon filling such a vast number of sinuses, in such a compact body as that of the womb, the circulation of the blood must, in a great measure, be stopp'd in that part; and consequently the blood, passing that way, must distribute itself through the neighbouring parts, and greatly oppress them, which will occasion many troublesome symptoms, † that must of necessity continue till the way betwixt the sinuses of the womb and womb-cake is so clear, that the blood, which used to return by the veins of the womb, can freely pass this way to the fœtus, which is the first relief they can have, because, after pregnancy, the sinuses are always more and more distended, and consequently the communication betwixt the arteries and veins always more and more stopp'd.

* Hence it is entirely chance what part of the egg happened to unite with the cavity of the bottom of the womb, and what part was next the neck of the womb; therefore it must be entirely accidental what part of the egg becomes the womb-cake, and what the chorion and amnion, or the external and internal covering of the fœtus.

† Such as pains in the back, cholicks, nausea, &c. and the more tender any of those parts are, the spreading force will be more felt. A great many of the lower parts of the body being thus harass'd, the rest, with whom they have a connection and sympathy, must at the same time be somewhat disordered, especially the head, which, in most people is so easily affected, that the least disorder disturbs it; but tho' the whole body at this time suffers, yet the parts, adjacent to the womb, must much more so; likewise the breasts, from the connection they have with the epigastric arteries.

This affords a clear idea of the new force, that makes the womb distend so remarkably upon impregnation; and from the following observation, concerning the distention of the womb, we shall easily conceive the whole procedure of this affair, hitherto mysterious to some.

After the blood, upon pregnancy, has reached the sinuses in its ordinary course, without entering the cavity of the womb, it must continually distend them, and so compress their interjacent vessels; hence the blood, which enters the womb, by the hypogastric and spermatic arteries, will be stopp'd in its direct course along the vessels, and forced to exert its utmost force upon the sides of the arteries and sinuses, to which it has an easy access, but a difficult exit; and there being every where ramified through the substance of the womb, every part thereof will have a share of this new force upon it, and consequently every part of the womb must be distended, more or less, in proportion to its strength.

The fœtus, while in the womb, is involved by two coats, already mentioned: the external, called **CHORION**, is a thick spongy membrane, contiguous to the womb, immediately embracing the second, or internal membrane, called **AMNION**, which is a fine Case W 34. delicate bag full of clear liquor, in which the fœtus swims; but these membranes are broke at the time of birth, and the liquor emitted.

Besides these membranes, there is another, a very beautiful one, like a bag in some beasts, especially cows, called **ALLANTOIS**, about twelve foot long, and one foot over when blown up, which is found open with the urachus, and serves to collect the urine. Some maintain it to be as necessary in human creatures, as in beasts; and that it must unavoidably exist in a human subject. Some place it between the external and internal coverings of the fœtus, others under the internal; but since it has not yet been visible to the best anatomists, and the urachus is generally found shut in a human fœtus, likewise very good reasons can be given why the author of nature thought proper to free
women

women of this burthen, wherefore we have no sufficient argument for its existence †.

Cases G L The WOMB-CAKE, or after burthen, is of a 13, H 19, round plain figure, about eight or nine inches over, and P 25, W 35, one thick. Its convex part adheres to the womb ||, D N° 1, 23, and its concave side towards the fœtus; having many O N° 3, 27. large blood vessels is joined to the navel string, and surrounded by a smooth membrane from the external and internal coverings of the fœtus.

The womb-cake serves to absorb, with the external covering, the blood and nutritious juice, as the intestines the chyle, and afterward transmit it to the fœtus by the umbilical vein; and perhaps to transmit the urine, as well as the blood, from the fœtus to the mother.

Cases F a a The UMBILICAL VESSELS of a fœtus, after O N° 3, a a birth, that turn into ligaments, are two ARTERIES §, smaller than the vein, which arise on both sides, generally from the internal iliacks, or hypogastricks, and sometimes from the lowest part of the aorta, or great artery. They march forward in both sides of the bladder to the navel; from thence through the navel string, by several windings, to the womb-cake, where being divided and subdivided into infinite small branches, they

† *Boerhaave* endeavours to shew, by the following argument, that the urine may be carried off by another course. For, says he, the kidneys are proportionably larger in fœtus's, than adults; they continually secrete the urine which they filtrate, but that is not an acrimonious urine, it is sweet; the sphincter denies it an exit, because it is inspiration that forces the sphincter to yield; when the urine is too abounding, it passes through a membranous canal rising from the bottom of the bladder, and goes out with the navel-string through the umbilical vessels. This duct goes to the root of the womb-cake, where it terminates in a particular oval bladder, consisting of a proper membrane, placed between the womb-cake, and covered with the amnion and chorion, turning back upon it within the chorion, and growing to it. This is the repository for the urine, which becomes more plentiful, higher-coloured, and more like urine, the older the fœtus, and the nearer it is to its birth.

|| The place of its adhesion to the womb is not always the same, as has been already shewn, but it is generally fix'd to the bottom, where *Ruyfch* thought he had discover'd a new muscle, in women immediately deliver'd, consisting of spiral fibres, and also often to the posterior part of the womb.

§ Why there are two arteries and one vein, is perhaps for preventing a mortal efflux of blood, if the navel string should be broke by some accident, or the ligature should not be tight enough.

terminate

terminate and transfer the blood from the fœtus to the womb-cake, and from thence perhaps also to the mother again. And ONE VEIN, which is double the length of the arteries, arising in the womb-cake, by innumerable small branches uniting into one trunk; it proceeds from thence by the like windings between the arteries, along the navel string, and afterwards thro' the NAVEL to the LIVER of the fœtus, where it terminates in the sinus of the vena portæ, in which it pours the blood with the nutritious juice, received in the womb-cake; from whence they, for the most part, immediately pass into the vena cava, or great vein, and heart thro' a particular canal called the venal duct*, almost opposite to the umbilical vein, vena cava, and heart; but the remaining part is distributed by the branches of the vena portæ through the liver. Cafe P 26.

The URACHUS, in a human fœtus, is not entirely open, or at least very rare, but generally solid like a ligament or band †. Cafes F z
D N° 2, 32,
O N° 3, 29.

The NAVEL-STRING is a twisted part like a rope, about an inch thick, consisting of ONE VEIN and TWO ARTERIES, as above observed, surrounded with a common, thick, soft, spongy membrane, from the external covering of the fœtus. It arises from the womb-cake, and terminates in the navel of the fœtus. It is about two foot long, for the fœtus to move freely, without pulling the womb-cake from the womb, likewise to prevent a mortal flux of blood, if a ligature should not immediately be made upon the vessels, after Cafes G L
I 4, H 20,
P 26, W 36,
D N° 1, 24,
O N° 3, 28.

* The want of respiration obliged nature to form the venal duct, for shortening the circulation; for if all the blood were to circulate thro' the liver, there would have been a great difficulty attending its exit, because there would not have been force enough to propell it, and the liver would likewise have been swelled to a prodigious magnitude; likewise the fœtus could not have had its nourishment in time, besides, a part of the nutritious milky juice would have been filtrated in the liver. When the umbilical vein is stopp'd, the vena cava compresses, and shuts this canal.

† Hence it appears that it does not perform the office of a canal in a human fœtus, especially since the allantois, or some other place of the like nature, cannot be found in which it discharges itself.

the exclusion † of the fœtus, and for the more easy extraction of the after-birth. Its use plainly appears from what has been said concerning the womb-cake, and umbilical vessels.

The NUTRITION OF THE FŒTUS, in the first months, is performed only through the umbilical vessel, because the organs of digestion are not yet completely formed; but in the last months, for several reasons through the mouth also, by a clear thick liquor prepared and subtilized to pass out of the vessels of the womb, into the pores of the external covering of the fœtus, and is more thoroughly altered in its vessels; then, passing into the vessels of the internal covering, is further perfected there, and discharged into the cavity of the internal covering. 1. A liquor, of a like kind, is found in the mouth, gullet, and stomach, both in human fœtus's and beasts. 2. We see this liquor changed, and in a manner digested in the small guts. 3. A large quantity of excrements are found in the guts, which, if they were cleared of immediately after the birth, in a proper manner, by a skilful director, and with due care, would prevent violent gripings, convulsions, &c. that too often prove fatal to many poor infants. 4. The fœtus is surrounded by a large quantity of this liquid in the first months, but very little in the last months, which seems only to be consumed by the fœtus. 5. This liquor seems so fit for nourishing the fœtus, that a better cannot be desired; it is forced into the mouth, gullet, and stomach, by the perpetual resistance of the womb, pressure of the abdominal muscles and circumambient air; for keeping open the gullet, intestines, lacteal vessels, and gradually bringing them to their destin'd functions.

Cases G 15,
H 21.

The SITUATION of the FŒTUS in the womb, for the first and middle months, is uncertain; but it is

† When the child is coming into the world, it is on all parts pressed and bruised, therefore I would entreat all midwives to let the navel string bleed a little before they tie it. The reason and necessity for so doing, I think, seems very plain. This hint I owe to that ingenious and experienced man-midwife, Mr. CHAPMAN, in *Orange-street*, near *Red-Lion-Square*.

commonly observed, in the LAST MONTHS, sitting Case L 15. with its NECK and HEAD bending down, its KNEES towards its CHEEKS, its HEELS clinging close to its BUTTOCKS, and its HANDS hanging down, and seeming to embrace its feet.

A short time before the birth, it generally turns itself, so that the HEAD falls down in the mouth of Case F 34. the womb, and the buttocks, with the feet, rise upward. But it often CHANGES its POSITION during the Cases G 15 whole time of gestation, and immediately before the H 21. birth its HEAD is sometimes perceived in the SUPE- Cases W 37, RIOR, or LATERAL PARTS of the womb. D N^o 1, 22.

The usual time, for the foetus's residence in the womb, are nine solar, or ten lunar months, or forty weeks. The premature is seven or eight months, after which the foetus may survive. The too premature is when the foetus is excluded before the seventh month, which is called ABORTION, and then the foetus cannot live.

S E C T. XII.

Of the BIRTH.

THE BIRTH is, when the surrounding membranes or coverings are broke, a natural ejection of a perfect foetus through the mouth of the womb and the great canal.

The EXCITING CAUSES are, when the intestinal feces and urine are increased, and cannot be expell'd, becoming uneasy to the foetus by their bulk and acrimony; the top of its head being placed to the mouth of the womb, and its face backward toward the rump-bone; the intestines and urinary bladder, being also full, stimulate and twinge the fibres, excite a troublesome sensation, motion, and struggle in the muscles of the belly, and the whole body of the foetus, which increases the former uneasiness: and then, using its utmost endeavours to press downward, occasions in the mother frequent motions to go to stool; so that, by the utmost struggles of the mother and child, the mouth of the

G

womb

womb is dilated and made more open, moistened and rendered slippery with a very slimy liquor, which loosens the parts; the membranes, containing the water, are broke, the water, they contained, flows out, and the head of the foetus is forced into the dilated mouth of the womb; and then, the endeavours of the mother being increased, the foetus passes out through the neck of the womb, made slippery by a slimy and oily liquor; the umbilical vessels, or navel string, the membranes and after-birth following, with some blood commonly along with them.

All other situations of the foetus, in time of the birth, besides the abovementioned, are reckoned preternatural, and the causes of a difficult, and sometimes impossible birth, unless corrected by art. But these births, where the foetus seeks for an exit, either by the feet or buttocks, approach, as much as possible, to a natural one, and the foetus may be born without the assistance of art, or with very little help.

When the birth is over, the fibres of the womb and peritonæum, the muscles of the belly and vessels, which were so much distended, begin gradually to contract, especially the womb, whereby they drive out, by degrees, the blood collected in the extended vessels, which is first clear, large in quantity, but presently more diluted, and less, and at last thick, pale, and very little, called the cleanings; and differs both in quantity, continuance, colour, smell, and thickness, as the mother suckles the child or not, or otherwise differs in function and temper.

When the parts are contracted, the vessels resist the disposition of more blood; about the third day after the birth, the hypogastric, communicating with the mammary arteries, begin to pour into them more blood, which used to go to the womb; and also a watry chyle, which fills them fuller, and distends them. Upon this change of the motion of the humours, there happens a small fever, a swelling, hardness and pain of the breasts, and also milk. For the breasts being placed free only in fat, and a skin that is easily distended, and receiving external arteries from the axillaries, and internal

ternal ones from the subclavians, descending into the chest, and passing out through the intercostals and breast bone, they come to the breasts, communicating with the epigastricks; and being strangely twisted and wound up in knots, they disappear, and at last send out small milky tubes; which, being united into larger, at length become great broad milky vessels; these grow narrower at the ends, and terminate with a small pipe in the middle of the nipples again.

These nipples, being nervous and spongy, have a great many emissaries, varying in number, that communicate before they terminate; they have a small cavity full of oily, and sometimes milky repositories, with a great many nervous papillæ; so that, by suction, they yield a continual nourishment by a supply of milk, and the greater in proportion the more they are sucked. This milk is easily turned into whey, cheese, cream, and butter; the cheesy part growing very hard; it does not thicken at the fire like whey, but turns sour immediately when left to itself. It is sweet, white, and without smell, composed of chyle, and the soft oily humours of the mother's blood *.

* Hence it appears why pain, hardness, distension of the breasts, elevation of the nipples, or droppings of serum toward evening happen to women with child; and why these are increased during the first three days after birth; why, by repelling the milk, the cleansings are increased, and the contrary; why the colour, taste, smell, and strength of what is eaten greatly alters the milk; why milk will scarce flow out of its own accord, but, when first sucked, often flies out freely; why fœtus's, of both sexes, have milk in their breasts; why milk, of all other animal humours, chiefly turns sour; and why it easily turns to cream or cheese: also, why at several distances of time, from eating and drinking, it is different; why, presently after eating, having fasted before, it communicates the retained good or bad quality of what was eaten: and is best four or five hours after meals; why, after fasting twenty-four hours, it is salt and ungrateful, yellowish, and soon grows fetid and loathsome to the infant; and lastly, what rule ought to be observed in prescribing a good diet to infants.

CHAP. IV.
Of the CHEST.

SECT. I.

Of the Breasts.

HAVING already considered the scarf-skin, skin, and fat; likewise the bones belonging to the **CHEST**, which is that part of the body between the neck and belly, we have here externally the muscles, of which in another place; and the **BREASTS**, which, in men, are more for ornament than real service. The requisites for beautiful breasts, in the angelic part of the creation, are a moderate magnitude, due distance, soft white skin, somewhat hard substance, and a small rosy nipple. In virgins they are of a moderate magnitude, but in pregnant women and wet-nurses, pretty big; in girls and old women, small. They begin to grow round and plump about the 14th or 15th year; but the time of their decrease is commonly about the 50th year, sometimes sooner, and sometimes later. The substance of the breasts, besides the scarf-skin, skin, and fat, is composed of a great many glands, whose canals, as they approach the nipple, unite and form **SEVEN, EIGHT**, or more small pipes, called the **MILKY TUBES**, which have several cross canals, whereby they so communicate with one another, that, if one of them be stopp'd, the milk, which was brought to it, might not stagnate, but pass thro' the other pipes, terminating in the extremity of the nipple, which has an exquisite sense, and a small erection when handled.

See the
 left breast
 marked **X** in
 Case F.

The breasts serve not only for ornament, but to separate the milk for nourishing the infant. The canals, com-

composing the substance of the breasts in maids, are so closely contracted, that no part of the blood can enter them; but when the womb grows big with the foetus, and compresses the descending trunk of the great artery, the blood flows in a greater quantity and with a greater force thro' the arteries of the breasts, and makes a passage into their substance, which, being at first narrow, only admits a thin water; but growing wider, as the womb grows bigger, receives a thicker fluid, which, after birth, becomes a thick milk, because the blood, which before flowed to the foetus, and for three or four days afterward by the womb, beginning then to stop, still more dilates the substance of the breasts. Under the breasts lie the muscles which compose the fore-part of the chest, but of these in their place.

S E C T. II.

*Of the Diaphragm, Pleura, Mediastinum,
and Thymus.*

THE DIAPHRAGM, or MIDRIFF, is a large strong oblong muscle, tendinous almost in the middle, dividing the breast from the belly, and so situate between these two cavities, that its fore-part is higher than its hind. It arises by TWO LONG TENDONS on the right side from the three first joints of the loins, and the last of the back; and on the left, from the upper joint of the loins, and the last of the back, and is fixed to the lower part of the breast-bone, and the five inferior ribs.

In this muscle are three holes, ONE in the left side for the gullet to the stomach; ONE in the right side, thro' which the great vein ascends to the heart; and the THIRD, between its two heads, for the great artery, azygic vein, and thoracic duct, or canal.

The

The midriff, in its natural situation, is convex on its upper side toward the breast, and concave on its lower side toward the belly; in expiration it is moved upward, and in inspiration downward; therefore when its fibres swell and contract, it must become plain on each side; and consequently the cavity of the breast is enlarged to give the lungs liberty to receive the air in inspiration.

Cases B 6.

The PLEURA is a smooth, strong membrane, lining the whole cavity of the chest. It consists of two bags, situate sideways with respect to each other, and in such a manner, as to form a double partition, called the MEDIASTINUM, running between the joints of the back and the breast-bone, their other sides sticking to the ribs and midriff. The pleura, in general, serves to line the cavity of the chest. The mediastinum cuts off all communication between the two cavities, and hinders one lung from pressing on the other when we lie on one side. It likewise forms receptacles for the heart, its bag, gullet, &c.

Cases B 5
P 7.

The THYMUS is a compound gland, situate in the upper part of the chest, immediately under the breast-bone, lying on the great vessels of the heart. Its structure and secretions are not yet sufficiently known to determine its uses, which however seem designed more for the foetus than the adult.

SECT. III.

Of the Pericardium and Heart.

Cases B 4
F 2 I 6.
Case W x.

THE PERICARDIUM, or HEART-PURSE, is a strong membranous bag, connected with the mediastinum, TENDINOUS PART of the midriff, and with the great and common vessels of the heart. It incloses the heart, serves to keep it in its place, without interrupting its office, prevent it from rubbing against

against the lungs, and to contain a liquor * for moistening its surface.

The HEART is a strong muscle, somewhat resembling a cone, or the top of a sugar-loaf, flattened on the sides, round at top, and oval at the base. It is hollow within, and divided by a partition into two cavities, called VENTRICLES; the right is thin and soft, the left thick and solid. Each ventricle has two openings at the base; the RIGHT ventricle opens into the right auricle, and into the trunk of the pulmonary artery, for the reception of the blood from the right auricle, and throwing it into the pulmonary artery; the LEFT into the left auricle, and into the trunk of the aorta, or great artery, for the reception of the blood from the left auricle, and throwing it into the aorta. Round the edges of these openings are several valves, or flood-gates, which are of two kinds; one kind, namely, those round the openings that answer to the auricles, allow the blood to enter the heart, but stop its return; the other, namely, those round the openings that answer to the pulmonary and great artery, allow the blood to go out of the heart, but hinder it from returning. The valves of the right ventricle, answering the auricle, are two in number, and called, from their supposed resemblance to a mitre, *mitral* valves; the valves of the left ventricle, answering the left auricle, are three in number, and termed, from their representing a three pointed figure, *tricuspidal* valves. These five valves are fastened by several tendinous ropes to the fleshy columns of the ventricles. The valves in each ventricle,

Cases A C E
K 2 I 7.
Cases A K 6
C F 5 I 10
Cases A E K
I 2 C 11
I 14.

* The liquor contained within the pericardium, like the washings of flesh, is generally of a small quantity, though in a dropical man I found it above an English pint. Many anatomists deduce this liquor from the glands, which they think are either in the pericardium or heart; but since we cannot demonstrate the existence of these glands, I am rather inclined to think that this liquor is squeezed from the heart and auricles, when in their contraction, and again absorbed from the pores of the pericardium, and not excreted.

situate at the mouths of the pulmonary and great artery, are six in number, and, from their imaginary resemblance to a half-moon, are named *semi-lunar* valves.

That artery which goes out of the right ventricle, called the PULMONARY ARTERY, runs first directly upward for a small space; then divides into two PRINCIPAL BRANCHES, one for each lung, that which goes to the right lung being the longest.

That artery, which comes out of the left ventricle, is termed the AORTA, or GREAT ARTERY; as it goes out, it turns a little toward the right, and then bends obliquely backward, to form what is called the

AORTA DESCENDENS, or the GREAT DESCENDING ARTERY. From about the middle of this great curvature, or crook,

THREE GREAT BRANCHES arise, which furnish the head and the upper extremities, with an infinite number of lesser branches; as the descending artery, in the same manner, the chest, belly, and lower extremities.

The AURICLES of the heart are two fleshy bags, situate at the base of the heart, joined together by an inner partition, and external communicating fibres.

The RIGHT, larger than the left, has two other openings, united into one, besides that which unites with the right ventricle, and formed by two large veins, which meet and terminate there almost in

a direct line, called the ASCENDING and DESCENDING CAVA, or GREAT VEIN. This auricle receives the blood from the ascending and descending cava, and thrusts it into the right ventricle.

The LEFT AURICLE has only one opening, be- Cafes A E K
sides that which joins with the left ventricle, where 11 C 10 I 13
the two pulmonary veins, which unite into one branch,
terminate. This auricle receives the blood from the
pulmonary vein, and throws it into the left ventricle.

The heart has, besides its great common vessels,
arteries and veins, called CORONARY VESSELS, be- Cafes A 19
cause they in some measure crown the base of the E x.

heart. The coronary arteries, which are two in num-
ber, go out at the beginning of the great artery, and
spread themselves round the base of the heart, to whose
substance they send numerous branches. The coronary
veins are distributed much in the same manner with
the arteries, and their trunk opens into the right auricle.
The heart is situate between the two lobes of the lungs;
it lies transversely almost on the midriff, the greatest
part of it being in the left cavity of the chest, with
the point turned toward the bony extremity of the
sixth true rib. The base is toward the right cavity,
and both auricles, especially the right, rest on the mid-
riff. The origin of the pulmonary artery, is, in this
situation, the highest part of the heart on the fore-
side, and the trunk of this artery lies in a straight plane;
therefore some part of the base of the heart is in the
right cavity of the chest, and the rest, as far as the
point, in the left; which is the reason why the me-
diaſtinum is turned toward the left side.

It is connected, by means of the pericardium, with
the mediastinum, spine, breast bone, and midriff, lest
the different motions of the body should set it awry,
or turn it out of its place, which unavoidably must
bring on immediate death: its base is connected by
the common vessels.

The heart, with its parts, are the chief instruments
of the circulation of the blood. The two ventricles,
like two syringes closely joined together, unite into
one body, and are furnished with suckers placed in
contrary directions to each other; so that by drawing
one of them a fluid is let in, and forced out again
by the other. This muscle is capable of two mo-
tions,

H

tions, viz. that of contraction, and that of dilatation, which anatomists call the systole and diastole of the heart.

Cases A K

3, 4--5

6--7

8

10--11

12

13

3, 4.

Having a little considered the heart, with its appendages and uses, the circulation of the blood will now appear plain to every one: for the blood is thrust out of the ASCENDING and DESCENDING CAVA into the RIGHT AURICLE of the heart; out of that into the RIGHT VENTRICLE; from thence, by the PULMONARY ARTERY, into the LUNGS; from the lungs, by the PULMONARY VEIN, into the LEFT AURICLE and VENTRICLE; out of the left ventricle into the AORTA, whose branches convey it to all parts of the body, except the lungs, and pour it into the smallest branches of the veins; out of which it passes into branches still larger, till, by the ASCENDING and DESCENDING CAVA, it is brought back to the heart, which is the motion of the blood from and to the heart.

The circulation of the blood in a foetus, while in the womb, on account of the want of respiration and the compression of the lungs, is performed after another manner than in those that breathe: for the blood, except a small quantity, is not forced thro' the lungs, but passes partly thro' the foramen ovale, or a hole in the partition of the auricles, which, after birth, is shut; and partly through the canalis arteriosus, or a communicating canal between the pulmonary and the great descending artery, immediately below the left subclavian artery, which, after birth, shrinks and, by degrees, degenerates into a ligament.

Before the contraction and dilatation of the heart, and the reciprocal or mutual actions of the ventricles can be accounted for, or understood, we must here insert the six following propositions taken from *Monro*.

1. All muscles are furnished with blood-vessels and nerves, and their action depends on the influx of blood, and of the nervous fluid into their muscular fibres; therefore when muscles are deprived of a sufficient quantity of either, or both these fluids, their action is either weaken'd, or ceases. This is proved by compressing, tying, and cutting the nerves or arteries of muscles.

2. All

2. All muscles are in a state of action, while supplied with blood and the nervous fluid, which is evident from the continued contraction of the sphincters of the bladder and anus, and of such muscles whose antagonists are cut asunder, or become paralytick.

3. The nerves of the heart pass to it between the two auricles or arteries.

4. The coronary arteries, which supply the heart, rise from the aorta, immediately above the middle loose part of the semilunar valves, in the same height with the aorta, where the angles of these valves are fixed.

5. The edges of the semilunar valves are duplicated with a muscular corpuscle in the middle, and muscular cords, running obliquely, from that corpuscle to the insertion of the valves, into the aorta.

The truth of these three last propositions is fully demonstrated by dissections.

6. Before the vessels, in which the circulation is performed, can act, we must suppose them full of liquors, otherwise the whole vascular system could not at once be put into action, and the motion of the fluids, sent out from the heart, could not be propagated to that in the returning vessels, consequently the circulation would be stopped when begun.

If then both auricles and ventricles attempt, upon the first communication of motion, to contract, the ventricles, being stronger, will force their contraction, and hinder the contraction of the auricles, which must be much dilated by the influx of blood from the veins *. And at this time the arteries are also distended, * Prop. 6. by the blood thrown out of the ventricles; therefore the cardiac nerves lying between them * will be com- * Prop. 3. pressed and prevented from exerting their office. While this happens to the nerves, the blood rushing out of the left ventricle into the aorta, and thrusting the semilunar valves outward and upward, distends the great artery considerably, whereby the valves are stretched, and their lunated edges are brought to be straight, and as high as their angles; consequently these edges, thus raised and pressed to the sides of the aorta, are

* Prop. 1.

made to cover the orifices of the coronary arteries, which the corpuscles will assist to do more adequately; and therefore, while in this situation, no blood can be sent to the substance of the heart. If then the nerves do not exert their office, and access is denied to the blood, this muscle, the heart, must * become paralytick or unactive.

The auricles, which were attempting all this time to contract themselves, will now, when their resistance is removed, throw the blood they contain into the ventricles; and the arteries, that were violently distended, while the ventricles pushed the blood into them, will, when the ventricles cease to act, constrict themselves; and the semilunar valves will, by their elasticity, assisted by the muscular corpuscles and cords, be depressed inward. Since then, by the constriction of the auricles and arteries, the nerves of the ventricles are freed from the compression they suffered, while the auricles and arteries were distended; and since the blood in the aorta pressed strongly by the contracting sides of this artery, and resisted by the fluids, which are to be thrown through all its branches, is also pushed with great force on the orifice of the left ventricle, thrusts back the semilunar valves which stop its entry into that cavity, and impetuously rushes into the coronary arteries: Since then, the nerves of the heart are again free from compression, and the blood is again sent to the heart by its arteries, its muscular fibres must again contract *. And thus, while these causes continue to act and cease alternately, their effects must be exerted in the same manner; that is, while the animal lives, the heart must have an alternate state of contraction, called its systole, and of relaxation, termed its diastole; and the auricles and arteries must be dilated, while the ventricles are contracting; and the ventricles must be dilated, while the auricles and arteries are constricted, or their actions must always be reciprocal.

* Prop. 2.

S E C T. IV.

Of the Lungs.

THE LUNGS are two large spongy bodies, filling Cases A 8 almost the cavity of the chest, one situate in B 4 C 6 the right, the other in the left side, and connected K 9. with the breast-bone and spine, by the mediastinum; with the heart by the pulmonary vessels, and with the wind-pipe. They are of a reddish colour in children, greyish in adults, and bluish in old people. Their figure answers the cavity of the chest, that is, convex next the ribs, concave next the midriff, and irregularly flattened and depressed next the mediastinum and heart. But when we view the lungs out of the chest, after blown up, they somewhat represent an ox's hoof, with the fore-part turned to the back, the back-part to the breast-bone, and the lower part to the midriff. Each lung has two or three portions called lobes, of which the right has three, or two and a half, and the left two. The right lung is larger than the left, in proportion to that cavity of the breast and the obliquity of the mediastinum.

The lungs are covered with a membrane, which is a continuation of the pleura, and the greatest part of their substance is spongy, composed of an infinite number of membranous cells and of different sorts of vessels, spread among the cells in innumerable branches.

The vessels, which make a part of the substance of the lungs, are the air-vessels, arteries, veins, and lymphatics, to which we may add nerves.

The AIR-VESSELS are composed, in the beginning, Cases A 22 of imperfect rings, but afterward of pieces joined in C 13 E 15 a different manner; and of cartilaginous and contractile K 12. membranes, which, arising from the wind-pipe, are first divided into two branches, afterward into innumerable small ones, ending in very MINUTE VESICLES, leaving Case E 16. interstices, which, communicating with each other, make up the chief substance of the lungs, adhering to the small branches like so many clusters of grapes.

The

Cases A 9 C E K 8.

Cases A 10 C E K 9.

The PULMONARY ARTERY and VEIN are divided, as was observed in the last section, like the air-vessels accompanying them every where, but in different places and in a different situation; at last they form, by their minute extremities, *Malphigi's* vascular membrane, and serve not only for the nutrition of the lungs, but for the circulation of the blood thro' the lungs*.

The BRONCHIAL ARTERY of *Ruyfch*, destin'd for the nutrition of the lungs, arises from the great artery; sometimes by one, sometimes by two, and sometimes by three branches, and every way closely coheres with the air-vessels.

The bronchial vein arises from the intercostals or azygic vein †.

The nerves take their origin from those of the chest, eight pair, and intercostal.

Case M N 4. The LYMPHATICS enter the thoracic canal.

The lungs chiefly serve to promote the action of respiration, but how this action is performed, which is partly voluntary, and partly involuntary, is attended with some difficulty in being understood; because a great number of organs are concerned in this affair, which ought to be carefully enquired into, and their phænomena duly adjusted; but as the intended brevity and plainness of this performance will not allow it,

* Several anatomists dispute the reason of the pulmonary artery's being larger than the pulmonary vein; when the veins are in all other parts larger than the arteries. Some think that this is done, because the blood in the artery, being too quick in its motion, might be driven again into the lungs by respiration, or condensed; and therefore it requires less space in the pulmonary vein: but the reason of the artery's being larger here, is, because the blood flowing back to the heart, on account of its thickness, cannot easily pass thro' the subtil and vasculous net of the lungs, for it vehemently struggles with this; hence in some manner it is retarded in its process, whence the artery is distended and dilated; on the contrary, the blood in the pulmonary vein scarce meets with any remarkable obstacle to hinder it from rushing freely into the heart; hence this is either less or narrower.

† *Heister* observed the bronchial veins in a female subject, which in vain he has often searched for in a male, arising from intercostal veins terminating by some branches in the air-vessels, three of which were about the thickness of a small straw; but *Cowper* saw one or more enter the subclavian vein.

I shall therefore give such a hint as may be easily comprehended by the less knowing.

The lungs, when suspended in the open air, are contracted into a less compass than when in the cavity of the chest, which is owing to the air's universal flux to them, its universal and equal pressure upon them, and to the fleshy fibres that tie the parts of the air-vessels together. The lungs, thus contracted and filled with air, thrust with a sufficient force thro' the wind-pipe, are so distended, as to possess an equal, or a greater space than that assigned them in the cavity of the chest: the same also happens, if, while the air passes thro' the wind-pipe, the external pressure be diminished, as may be seen in the air-pump. Hence it is plain that the lungs, by their proper force, always endeavour to possess less space, than when contained in the cavity of the chest; and that they are in a continual state of contraction, while a man is living, and therefore would contract and fall together, was the whole body contained in an exhausted receiver; for it is the midriff, and not the common air about them, that externally compresses them on every side, while life continues; yet air is always contained within them, which passes thereinto thro' the wind-pipe; therefore the lungs are more distended by the internal, than compressed by the external air, which is stopped by the midriff's being so fix'd to the ribs and back-bone, that it cannot enter the chest to make an equilibrium *. Since in inspiration the air enters the lungs in a greater quantity than before, this must extend them more and oppose their natural constitution, in which action the lungs are passive, as appears from what follows. In inspiration, we observe, when a man is asleep, 1. The nine upper ribs, joined to the back and breast bones, rise arch-ways towards the collar bones, so that this motion is chiefly observed in the

* This is plain from the growth and increase of a fœtus in the womb, and of a man; the lungs when blown, and from wounds penetrating the cavity of the chest, causing the lungs to collapse, and hindering them from dilating, sometimes on one, and sometimes on both sides of the chest.

middle of the arch; but the three lower are turned downward and backward, yet in such a manner, that the seventh, eighth, ninth, and tenth are drawn inward. 2. The belly, at the same time, swells more and more, during the time of inspiration, and is pressed outward. 3. The capacity of the chest is, at the same time, enlarged, as is plain by measuring it, and from the mechanical consideration of its figure, situation, connection, and the articulation of the ribs. The midriff, in this action, being contracted, is brought down into a more plain figure, as appears from incisions made in living creatures, and large wounds in the belly. The capacity of the chest being thus enlarged, and the lungs having no incumbent pressure, therefore the air, passing thro' the wind-pipe, fills them till they are contiguous to the sides of the cavity of the chest and midriff. In this case the air presses the lungs equally, and the chest equally resists this pressure, and so the lungs being at rest, the blood passes with greater difficulty, and is forced into the left ventricle of the heart in a smaller quantity, and so less comes to the brain and its nerves, and the arterial blood acts with a less force upon the intercostal muscles and midriff; the causes therefore that dilate the chest grow weaker, the ribs are again depressed, the peritonæum and the muscles of the belly, which in the action of inspiration were distended, restore themselves, and the contents of the belly, thus pressed, thrust the midriff, which is now loose, upward again into the chest; and, that contracted, the air is drove out of the lungs, which is called EXPIRATION. Thus by these two actions, the blood is propelled and quickened in its passage thro' the lungs. At this instant, the blood, being hastened in its motion, begins to flow stronger and more plentifully to the brain and muscles, the intercostal muscles and midriff renew again the causes of contraction and inspiration is repeated, and thus these alternate motions are continued. But besides these causes of respiration, there are others subservient to the will, which are also applied to the ribs for dilating

lating or contracting the chest; but as these are dependent upon the action of the muscles of the chest, &c. I shall therefore refer you to that part in the doctrine of the muscles.

SECT. V.

Of the Wind-Pipe.

THE WIND-PIPE is a cartilaginous canal, ex-Cases A I tending from the jaws to the lungs, situate in the 23 E 17 N middle and fore-part of the neck, connected with the 25 S T 5. jaws, lungs, and gullet; the superior part of which is termed

The LARYNX, wherein is an opening to the Cases A 25 E lungs, called GLOTTIS, or the chink, which is contract- 19 I 21 N ed or widened according to the variation of the voice. 23 S T 3.

It chiefly consists of five cartilages. 1. The scu-Cases E 19 TIFORM, or shield-like cartilage, almost of a four-I 21 S T 3. sided figure, which is larger than the rest of the cartilages, and makes that prominence situate in the fore-part, called Adam's apple.

2. The ANNULAR, or round, possessing the lowest part, to which the wind-pipe inferiorly adheres.

3. 4. The two ARYTENOIDES, forming the chink, which are of a particular figure, and joined to the upper and hind part of the annular cartilage on both sides, for the more commodious dilatation and contraction of the glottis.

5. The EPIGLOTTIS, in figure of an ivy leaf, is Cases E 36 joined to the upper and fore-part of the scutiform car-K 25 M N 9 tilage, whereon it stands behind the root of the tongue, 5. with which it is connected in the middle by its ligaments; in the sides with the horns of the tongue-bone; and in the two hind parts with the arytaenoid cartilages; which, in swallowing, as a moveable bridge, covers the glottis, lest any thing should fall in it.

The glands that lie upon the outside of the wind-pipe, and serve for moistening it, are

I

1. The

Cases A N
24 S T 4
W 13.

1. The **THYROID GLAND**, horned like the moon, adheres, by its middle, to the superior rings of the wind-pipe; and with its horns erected upward, on both sides, to the larynx and gullet. Of which, see more in the doctrine of the glands.

2. The **BRONCHIAL GLANDS**, joined to the inferior part of the wind-pipe, and to the divisions of the air-vessels and gullet; they are greater and lesser, but their use is doubtful. See more in the doctrine of the glands.

The muscles of the larynx, which take their names from their origin and insertion, are seven pair.

Cases B 6 K 18 F 13 W 16 The **STERNO-THYREOIDÆUS**, or first pair, pulls the larynx downward; the Cases A 33 K 19 N 26 F 12 **HYO-THYREOIDÆUS**, or second pair, Cases A 32 C 17 N 27 pulls it upward; the **CRICO-THYREOIDÆUS**, or third pair, pulls the external T 14. cartilage of the larynx outward, or to one

side; the **CRICO-ARYTENOIDÆUS POSTICUS**, or fourth pair, with the **CRICO-ARYTENOIDÆUS LATERALIS**, or fifth pair, open the **CHINK**; the **THYRO-ARYTENOIDÆUS**, or sixth pair, and the **ARYTENOIDÆUS**, or seventh pair, contract the chink.

From what has been already delivered, we may easily conceive how the voice, speech, singing, laughing, coughing, sneezing, yawning, &c. are formed.

The voice is made in expiration, by those causes which contract the chest, thro' the wind-pipe from thence forced into its chink; and being drove upon a springy tremulous body, is, by that means, put into a reciprocal or waving motion, and forms a sound, which, coming thro' the narrow passage of the chink, to the cavities of the mouth and nostrils, is differently modified, according as the chink is open or shut, by the various actions of the muscles placed here; or as those cavernous parts are more slippery, rough, open, obstructed, or differently figured. Hence proceeds the different shrillness or dulness of the voice, for all that depends upon the quick or slow motion of the air; it is here made quicker as the passage is narrower, or as the air is drove out with a quicker motion; but a grave voice is the effect of a slower motion of the air.

air out of a larger chink *. If this sound strikes against the throat, tongue, teeth, lips, nostrils, and palate, it is thereby changed in its passage, and variously determined; and this is that which is expressed by letters, or what we call *SPEECH*. But since *SINGING* is to utter sounds, either grave or sharp, quick or slow, strong or soft, equal or unequal, this action appears from what has been said; whose graces depend on the voice, tone, time, and manner of turning it; a slippery surface in the throat, tongue, teeth, lips, palate, and nostrils, occasions a sweetness of voice, as also the conformation and structure of their figure. The quickness of the muscles that move the chink, the looseness of the ligaments which join the cartilages of the larynx, the different openings of the chink, with the large quantity of oily juice, seem to give the power of forming a variety of distinct and plain sounds; the form of the lungs and chest, which supply breath for sounds, is the chief cause of the strength and length of the voice, but the art of singing depends on an artificial turning and moving all these parts.

LAUGHTER is produced by an undulating or waving motion of the air, received into the dilated lungs and wind-pipe without renewal, which occasions its small, quick, and reciprocal or mutual shakings, in passing thro' the organs of respiration, the lungs almost remaining in the same degree of extension, and rather jumbling the blood together, than discharging it. Hence the reason why laughter is so fatiguing and ends often in convulsions, why it swells the jugular veins and the whole head, and why it occasions a redness of the face, neck, and eyes, and sometimes a difficulty of breathing, spitting of blood, an apoplexy, and death, if too violent and long continued.

* Hence when this chink is too much opened by those who endeavour to speak with a greater voice than they are able, the sound is lost; and there is the same loss of sound in forming a too sharp voice, the retained air causing a kind of suffocation of the lungs, and a harsh shrillness in the wind-pipe.

Hence also the reason of COUGHING, which arises from a great quantity of air drawn into the lungs, and retained a-while, upon which the wind-pipe being shut, and the midriff thrust up into the cavity of the chest, by the contraction of the muscles of the belly, which thickens the air and presses greatly upon the sides of the lungs; and then the wind-pipe being again opened, it is variously shook by several successive violent protrusions in expiration, which cleanses the inner surface of the wind-pipe *.

YAWNING is produced by almost expanding the voluntary muscles, and greatly extending the lungs, the breath being drawn in gently and slowly; and having been retained and rarified a-while, it is then gently and slowly breath'd out again, when the muscles are restored to their natural state; the effect of which is to move, quicken and equally distribute all the humours through their vessels.

CHAP. V.

Of the Neck, or third Cavity of the Body.

WE must not omit the consideration of the neck, situate between the chest and head, because its parts are of equal importance in life with those of the other cavities, therefore as necessary to be known.

The neck consists of common coverings, seven bones or joints, several muscles that move the head, neck, wind-pipe, gullet, tongue-bone, &c.

Having already treated of the bones of the neck, wind-pipe, and gullet, we will next describe the muscles, arteries, veins, nerves, spinal marrow, &c. in their proper places.

* Hence the reason why laughter often ends in coughing, and how little difference there is between these two actions; also why loud singing, bawling, sharp things or crudities, upon the inside of the air-vessels occasion it; hence also the reason of sneezing, before explained.

C H A P. VI.

Of the Upper Cavity or Head.

S E C T. I.

Of the Head in general.

THE head is one of the principal cavities of the body, and its out-side the seat and base of several complex organs; but the inside contains only one, viz. the brain, which is the first or chief mover of the whole animal œconomy.

The head, like other parts of the body, is furnished externally with a scarf skin, skin, hair and fat, of which already.

The muscles, belonging to the skull, are four; two in the fore-head called frontal, and two in the hind-head termed occipital. These muscles, by their tendons, surround the head, in its upper part, like a helmet. See the doctrine of the muscles.

The PERICRANIUM is a strong thin membrane, Cases F 5 of an exquisite sense, immediately surrounding and co-H I O N 3 hering with the skull, neighbouring muscles, and 1. dura mater, especially about the seams.

It serves to sustain the vessels for the nourishing and rendering the skull sensible; which, without this membrane, as being a bone, has no sense of feeling.

The skull, serving to defend the brain, consists of eight strong bones, joined by seams: of which already in the doctrine of the bones. But to view the inner parts, we must saw the skull about the middle, either cross or horizontally, and then separate the upper from the lower part, which, being removed, the red points, or broken vessels, shew how it adhered by the vessels to the subjacent dura mater, whereby its inside was nourished.

S E C T. II.

Of the Coverings of the Brain.

Cases F 7
H 2 O N 3
3.

THE DURA MATER, or the external covering of the brain, is a thick strong tendinous membrane, immediately situate under the skull, and almost of the same figure and magnitude of the brain and skull.

It is connected every where with the skull, but more loosely in the superior, than inferior part.

The dura mater has three processes made by the doubling of its inner membrane. The **FIRST**, resembling a sickle, therefore called **FALX**, rises by a narrow beginning from the **CRISTA GALLI**, to which it is fastened; and as it approaches the hind part of the head, it grows broader and broader, till it terminates where the longitudinal sinus ends. It divides the brain into two hemispheres or half globes, near as deep as the corpus callosum. The **SECOND** is a strong thick process, which separates the brain from the cerebellum, down to the medulla oblongata, that the weight of the brain may not offend the subjacent cerebellum. The **THIRD**, is the smallest, which separates the external substance of the hinder part of the cerebellum, into two protuberances.

Cases B 2
F 10 H 5
W 4.

Cases B 3 4
F 11 R 2
I N 2 6.

The dura mater has about thirteen visible sinuses or canals; as **FIRST**, the **SAGITTAL** or **LONGITUDINAL CANAL**, which, running from the frontal bone and crista galli, thro' the middle of the brain to the hind-head, ends in the **SECOND** and **THIRD**, or the two **LATERAL CANALS** *, which, discharging themselves on

* The lateral sinuses do not always arise by an equal and symmetrical bifurcation of the superior longitudinal sinus; for, in some subjects, one of the lateral sinuses appears to be a continuation of the longitudinal, and the other to be a branch from it. This variety may happen on either side; and we sometimes find one of these sinuses higher or lower, larger or smaller, than the other. *Morgagni* found the lateral sinuses communicating by a particular transverse canal, and *Heister* observed the same, which he has delineated in tab. 7. fig. 32. *Anat. Compend.*

both sides into the sinus of the jugular vein, as may be seen when the brain is taken out; the **FOURTH**, Cafes B 5 running along the broad extremity of the falx, is F 12 R 4 nearly inserted in that place, where the I N 2 7. other three meet, which place is called **TOR- CULAR HEROPHILI** *. Cafes B 6 F 13 R 3 I N 2 8.

The **FIFTH** and **SIXTH**, called the Cafes F 14 R 5. **SUPERIOR**, rise from the hinder processes of the sella turcica, or turkish saddle, run along the upper part of the internal process of the rocky or hard bone, then, descending, open into the lateral canals. The **SEVENTH** and **EIGHTH**, called the **INFERIOR**, Cafe R 7. rise from the same place with the two former, and, running upon the union of the rocky with the hind-head-bone, open into the lateral canals at their going out of the skull. The **NINTH** runs upon the third Cafe F 15. process of the dura mater, and divides into two branches, one of which opens into the lateral, and the other into the vertebral canals. The **TENTH** surrounds Cafe R 8. the pituitary gland, and communicates with the two superior and inferior canals. The **ELEVENTH** runs Cafes B 8 along the inferior edge of the falx, and opens into F 16 R 11. the fourth canal. The **TWELFTH** and **THIRTEENTH** are situate on each side of the second process of the dura mater, or external covering of the brain, and discharge themselves into the lateral canals.

All these sinuses communicate with each other, and serve to return the blood from the brain, and other adjacent parts, into the **INTERNAL JUGULARS** †. Cafe I N 2

The dura mater serves to line the inside of the skull 10. instead of a periosteum; likewise defend, strengthen,

* From an antient author, who imagined that the blood was as it were in a press, at the union of these four canals.

† Thus the blood, which is carried to the dura mater, &c. from the heart, by the external and internal carotide and vertebral arteries, is returned to the heart by the external and internal jugulars and vertebral veins; so that, when the blood is stopp'd in its passage in any one place, it finds another way, tho' not with the same ease, by those communications. This observation may be of service not only to obstructions, but to the different situations of the head.

and

and prevent the compression of the brain, and, by its canals, to afford it warmth and nourishment.

The ARACHNOIDES, or second covering of the brain, is a fine membrane, situate between the dura and pia mater, and so called on account of its resemblance to a spider's web. In the superior part of the brain it is so closely connected with the pia mater, that it cannot from thence be separated without being torn; but in the inferior part it is so lax, as to be there plainly seen, without being cut *.

It has the same extension with that of the dura mater, viz. over the whole brain and spinal marrow, but surrounds the latter very loosely, as is visible when suspended in water, or spirits of wine.

The arachnoides serves for a covering to the brain; but how far so thin a membrane, wherein no vessels are visible, can answer this intention, is yet uncertain. However, since the pia mater lies deep in the meanders of the brain, this membrane, being stretched over it, may serve to guard the subjacent vessels, tie up the furrows, and hinder foreign bodies from entering the brain.

Cases F 8
K 1.

The PIA MATER, or third covering of the brain, lies immediately under the former next the brain, which it closely surrounds, and is extended not only over its surface, but insinuates itself into all its furrows, windings, and folds; it likewise invests the spinal marrow and nerves. Hence it is larger than the other two membranes. It closely adheres to the brain and arachnoides above, but loosely below, and is connected with the dura mater, only by veins which open into the canals of the dura mater.

The pia mater serves to envelope the brain and sustain its blood-vessels, that they may be the better distributed thro' its folds, windings, and turnings, for supplying a sufficient secretion of the nervous fluid.

* Some either doubt of, or entirely deny the existence of this covering; but *Ridley*, with others, imagine it to be the external membrane of the pia mater.

S E C T. III.

Of the Brain.

THE brain is divided into two parts; that, situate in the upper and fore part of the skull, is called the cerebrum, and that in the hind-part, under the former, the cerebellum.

The CEREBRUM is a medullary mass, Cases A B F H I P W. almost of an oval figure, divided into LATERAL OR SIDE PORTIONS, by the first Cases A I F 8 W 2. process of the dura mater; and each of these again into FORE and HIND, termed Cases A 6 I A N 2, I K 2. LOBES.

On the external surface of the brain we see several inequalities or windings, like the circumvolutions of the intestines, formed by deep and narrow waving furrows, into which the foldings of the pia mater insinuate themselves, and thereby separate these circumvolutions from each other.

In cutting the cerebrum we observe TWO DIFFERENT SUBSTANCES, of TWO DIFFERENT COLOURS; the EXTERNAL, which is soft, of a greyish or ash-colour; and the INTERNAL, which is hard, white, fibrous and full of canals; it arises from the evanescent arteries of the external substance, and terminates at the beginning of the nerves, which take their origin from thence. After cutting off the falx from the crista galli, turning it back and carefully separating the two lateral lobes of the brain, we see a white convex body called the CORPUS CALLOSUM *, or the covering of the two lateral ventricles, formed by the union of the medullary fibres of each side; this being laid aside,

The TWO LATERAL VENTRICLES appear, which go from the fore-part of the brain backward, contracting in breadth, and separating from each other gradually in their progress; afterward bend downward, return obliquely from behind forward, in a crooked

* In this *Lancifus*, with some other anatomists, placed the seat of the soul.

course, like the turning of a ram's horn, and terminate almost under their upper extremities. These ventricles are divided into right and left, by a thin transparent partition, called *SEPTUM LUCIDUM*, lying directly under the seam of the corpus callosum, of which it is a continuation.

The *FORNIX*, so called, from its supposed resemblance to the arches of antient vaults, is only part of the corpus callosum; its lower side is like a hollow cieling, with three angles or corners, covering the third ventricle. The fornix being removed, we see

Cases B 10
Q 5 R 15.

1. *PLEXUS CHOROIDES*, or a fine web, consisting of a great number of arterial and venal branches, collected into two loose bundles, which lie one in each lateral ventricle, and partly expanded over the neighbouring parts *.

Cases A 3
B 14 F 18
R 14.

2. *CORPORA STRIATA*, or the striated bodies, so termed, because, in scraping them, a great number of white and ash-coloured lines appear. These are two greyish colour'd eminences, that lie in the bottom of the superior cavity of the lateral ventricles; which they in some measure resemble in shape, their fore-parts being near the septum lucidum, from which they gradually separate as they run back, and diminish in size.

Cases A 4
B 15 F 19
R 16.

3. *THALAMI NERVORUM OPTICORUM*, or THE BEDS OF THE OPTIC NERVES, are two large eminences, situate by the side of each other, between the posterior extremities of the striated bodies; they are of a whitish colour without, but their inner substance is partly white and partly grey.

Case Q 9.

4. *NATES* are two prominences of an oval figure, whose surface is white, but their inner substance greyish; immediately behind them are, 5. Two other prominences, of the same figure and substance, called

10. *TESTES*.

Directly under the place where the last two prominences of one side unite with those of the other,

* For the use of this web, vid. *Willis Cerebri Anatom.* p. 90. c. 14. *Lond.* 1664. and *Vieussens Neurograph. Universal.* p. 208. c. 17. *Francf.* 1690.

lies a small middle canal, which communicates before with the third, and behind with the fourth ventricle. Where the fore-parts of the nates join the hind-parts of the thalami nervorum opticum, is a small opening left between these four convexities, communicating with the third ventricle, and the above-mentioned canal called ANUS.

6. The PINEAL GLAND is a small soft greyish body, about the size of an ordinary pea, situate behind the thalami nervorum opticum and above the nates, and is fixed like a small button to the lower part of the thalami, by two medullary foot-stalks *. Below this gland is a small medullary cord, called the posterior commissure of the lateral lobes of the brain. Between the two optic beds, at their union in the fore-part, lies a small cavity named

INFUNDIBULUM, or funnel, which runs down toward the base of the brain, contracting gradually, and terminates in a straight course by a small canal in

The PITUITARY GLAND, which is a small spongy body, of a greyish colour, situate in that cavity of the wedge-like bone, called sella turcica, and suspended by the dura mater †. This gland is surrounded by a web of blood-vessels, called

RETE MIRABILE, or the WONDERFUL NET, which serves to break the force of the blood, and abate its motion in passing thro' the tender substance of the brain. At the lower of the beds of the optic nerves, directly under this union, lies a canal, called

The THIRD VENTRICLE of the brain. This canal opens forward into the funnel, by which it communicates with the lateral ventricles; and behind into the anus, or that canal which goes to the fourth ventricle.

* In this gland *Descartes* placed the seat of the soul. For its use, vid. *Willis Cerebri Anatom.* p. 90. c. 14. *Lond.* 1664. and *Vieussiens Neurograph. Universal.* p. 208. c. 17. *Francof.* 1690.

† This gland is supposed by some to imbibe the viscid moisture of the brain, and afterward discharge it; but *Heister* is of a contrary opinion, 1. because it is the proper function of glands to secrete some liquid. 2. A single canal would not be sufficient for this office; and 3. being a firm hard substance, it is very unfit for such a business.

Cases A 7
E 2 I A
N 2, 2.

The CEREBELLUM is also a medullary mass, almost of an oval figure, situate under the posterior lobes of the brain, in the hind and lower part of the skull.

Its surface is less winding than that of the brain, but in some measure furrowed; the furrows are largest in the middle, which gradually become less as they approach its fore and hind part, where they seem to resemble two worms, therefore called the WORM-LIKE PROCESS. In cutting the substance of the cerebellum,

Cases Q 12
R 13 I N 2,
4.

we observe TWO DIFFERENT SUBSTANCES OF TWO DIFFERENT COLOURS, like that of the cerebrum; the white here makes a most beautiful representation of shrubs. By separating the lobes of the cerebellum, we observe the hind-part of the medulla oblongata, or oblong marrow; and in the hind surface of this portion, from the nates and testes, all the way to the hind notch, and a little below it in the body of the cerebellum, an oblong cavity, terminating backward like the point of a writing-pen, called the FOURTH VENTRICLE of the brain. By this there is a communication between the ventricles of the cerebrum and spinal marrow.

The medullary substance of the cerebellum makes, on each side, three processes of the medulla oblongata; the first of which ascends from the cerebellum to the testes, and forms a valve, called the VALVULA MAJOR of the brain; the second makes that protuberance, termed WILLIS'S ANNULAR PROCESS; and the third descends to the spinal marrow.

Case A II,
12.

The MEDULLA OBLONGATA, or oblong marrow, is the lower medullary substance of the cerebrum and cerebellum, joined together in the shape of a tail, extended to the great hole in the hind-head bone, and giving rise to the spinal marrow and nerves of the brain.

Case B.

This is all that is remarkable in the cerebrum, cerebellum, and upper-side of the medulla oblongata; but while the brain is taking out of the skull, you will see its NERVES, the ENTRANCE of the carotide arteries into the skull, the FUNNEL, with its insertion into the pituitary gland, and *Willis's* SPINAL NERVE.

After

After the brain is taken out of the skull and turned Cases over, you will observe the INOSCULATIONS of the C 8, 9, 10 K carotide and vertebral arteries, with their DISTRIBUTIONS thro' the brain, the RISE of ten, or rather IN 2, 11, 12, nine pair of nerves, the FUNNEL, TWO WHITE SPOTS 13, &c.--21. behind it, the LEGS of the medulla oblongata, the ANNULAR PROCESS where these legs join, beyond Case E 3, them two prominences, called, from their figure, PYRAMIDAL BODIES; and below them other two, termed OVAL BODIES, then the medulla oblongata goes out of the skull. c

The brain, in general, serves to attend the functions of the soul, to secrete the nervous fluid, and send it to the nerves for sense and motion; but the cerebrum is chiefly designed for the secretion of the animal, and the cerebellum for that of the vital and natural fluid *.

After the brain is taken out, some particulars yet remain to be taken notice of in the skull, namely, the EGRESS, or GOING OUT Cases A B 1, 2, 3, &c. OF THE NERVES of the brain, the ENTRANCE OF THE ARTERIES of the Cases C 8, 9, 10, E 15, 17 brain; the GREATER SINUSES, or CANALS, of the dura mater, also the CIRCULAR and LESSER CANALS, with their passage out of the skull, and THEIR INSERTION into the jugular veins; the RETE MIRABILE, or NET-LIKE WEB of the blood-vessels, and the PITUITARY Cases A 13 GLAND. N 14.

The SPINAL MARROW is a continuation of Case I F. the medulla oblongata, which reaches from the head to the extremity of the sacred bone, and is strongly fortified like the brain, with six proper coverings. It is divided by a fissure, which reaches not so far as the middle, into the right and left, and is almost of the same substance with that of the medulla oblongata, which is medullary without, for the more easy exit of the nerves, but of an ashy colour within, like that of the brain.

* For a particular account of the brain and its uses, see *Boerhaave's Institutes*, and *Steno's Dissertation* thereon.

The spinal marrow gives rise to thirty-one, or thirty pair of nerves, which are chiefly distributed upon the extremities and external parts of the body, as may be seen with those of the brain, in the neurology, or doctrine of the nerves.

S E C T. IV.

Of the Eye.

THE EYE is that part of the body, whereby vision is effected; that is, whereby visible objects are represented.

The eye is divided into internal and external parts, or into the eye, properly so called, and its appendages. Under the latter class come the orbit, the eye-brow, the eye-lids, the edge of the eye-lids, and the angles.

Case N 6.

The ORBIT is that cavity made up of several bones, of which already in the doctrine of the bones, in which the eye is placed, and its figure is pyramidal. The cavity of this orbit is lined with a production of the dura mater, which partly comes thro' the optic hole, and partly thro' the orbitary fissure.

The situation of the two orbits represents nearly two funnels, placed sideways at a small distance from each other, so that their tops are almost joined, their nearest sides almost parallel, or equally distant from each other, and the other sides turned obliquely backward; and for this reason the middle of the edge of each orbit is farther distant from the nasal partition, than the bottom, and the edge is very oblique.

The eye-brow, in form of an arch, is covered with hair springing from some glands and fat, placed between the skin and fleshy membrane, on the upper edge of the bone, and is, by nature, contrived to stop the course of sweat, and keep it from falling into the eye.

Case C 3.

Each eye has two eye-lids; the upper moves very quick, and the lower scarce seems to move. The upper is lifted up by the MUSCULUS RECTUS, or straight muscle.

Both

Both eye-lids are brought to shut by another muscle, called ORBICULARIS, marked in the three last Cases with red figures. Cases N 4
A 1 B 5 C 2.

The edges of the eye-lids have two small soft CARTILAGES, like arches, which keep the eye-lids extended, that every part may be equally raised. Upon them is a rank of small glands, whose excretory channels open on the edges of the eye-lids. They yield a wax, which, in sleep, fastens the eye-lids together; they are covered, externally, with the skin, and, internally, with the white coat of the eye. On the edges of the eye-lids are hairs, in form of a pallisado, to break the too fierce impression of the rays of light and keep out flies, motes, &c. which might hurt the eye. Cases C x.

At the union of the eye-lids are two angles, or corners; that next the nose is called the GREATER, the other, the LESSER ANGLE. Near the lesser angle lies a small gland, called the LACHRYMAL GLAND. From this gland proceed two or three small CANALS, that furnish water enough to wash off the dust and keep the outer surface of the eye moist, without which the horny coat would be less clear, and the rays of light would be disturbed in their passage; and that this liquor may be rightly disposed, we close the eye-lids to spread it equally, when we are not conscious of doing it. Cases AB 3 C 2 N 8
Cases B 2
K 1.

Near the great angles are TWO SMALL HOLES, which receive the superfluous moisture of the eyes, and carry it off into the LACHRYMAL BAG, thro' the nasal canal to the nose. At the entrance of the lachrymal bag is situate the lachrymal caruncle, or little red point, which serves to keep the great angle of the eye from being totally closed, and thereby facilitates the falling of the tears into the lachrymal canal. Cases A 2
N 7.
Cases K 2.

Having considered the appendages; we shall now treat of the eye itself, which is almost of a round figure, and consists of coats, humours, and vessels. The globe of the eye is moved by four straight and two oblique

lique muscles; between them is a deal of fat for facilitating the motion of the globe.

Cases A B C₄ The four straight muscles are the ATTOLLENS, or
 5 that muscle which pulls up the eye; DEPRIMENS, or
 6 that muscle which pulls down the eye; ADDUCTOR;
 or that muscle which pulls the eye toward the nose; and
 7 the ABDUCTOR, or that muscle which pulls the eye
 toward the temples. When all these muscles act, they
 pull the eye toward the bottom of the orbit, or
 when any two of them act, they pull the eye in a
 crooked direction.

9 The two oblique muscles are, the OBLIQUUS MI-
 NOR, or that muscle which pulls the globe of the eye
 8 forward, and brings the pupil upward; and the OBLI-
 QUUS MAJOR, or that muscle which pulls the globe
 of the eye forward, and the pupil downward *.

The eye is generally reckoned to have four coats,
 viz. the adnata, sclerotica, choroides, and the retina;
 but the last three are the only proper coats.

Cases A B C_I The ADNATA covers that part of the eye called
 the white, and, being reflected all around; lines the two
 eye-lids. It being thus returned from the eye to the
 eye-lids, hinders extraneous bodies from getting behind
 the eye into the orbit, and smooths the part it covers,
 which makes the friction, or rubbing, less between the
 eye and eye-lids †. This coat is full of blood-vessels,
 as appears from the least inflammation.

Case A x. The SCLEROTICA, which is properly the first, is
 a firm case, fit for defending and covering the other
 two coats with the humours. The fore-part of this
 strong coat, being clear, is called the horny coat, and
 the rest the hard coat.

* If the right eye is raised in case C. you will have a fine sight
 of the situation, origin, and insertion of these muscles.

† This may rather deserve the name of a membrane than a coat, be-
 cause it covers but a part, whereas a coat covers the whole, or at least the
 greatest part.

The horny coat is surrounded by the white; it has a greater convexity than the rest of the globe, the reason for which shall be hereafter shewn. It is composed of several plates, nourished by many blood-vessels, so fine, as not to hinder the smallest rays of light from entering the eye. It has a most exquisite sense, so that, upon the least pain, the tears may be squeezed out of the lachrymal glands, to wash off the filth, which, by sticking to the horny coat, might render it cloudy or dim.

The CHOROIDES is a soft, thin, and black coat; and its inner or concave substance is very smooth. It has a great number of blood-vessels, which come from the hard coat, that cause its adhesion thereto, and are spread upon it; also several glands, which separate from the blood-vessels a black liquor that tinctures all this coat internally, which otherwise is of a whitish colour.

At a small distance from the union of the hard and horny coats, the black coat is closely united to the hard coat. Round this adhesion the black coat changes its colour, and forms a whitish ring of the same breadth with the adhesion. This adhesion is called the CILIARY ligament, tho', according to *Winslow*, improperly. The fore-part of the black coat is termed UVEA, and the hole, near its middle, has the name PUPIL. The fore-part is termed the IRIS, and the radicated folds of the posterior part, the CILIARY PROCESS. Between the two plates of the uvea, are two thin fleshy planes of fibres, which, the fibres of one plane being round, surround the circumference of the pupil, and those of the other being radiated, one extremity of which is fixed to the circular plane, surround the other to the edge of the uvea.

The space, between the horny coat and uvea, contains the greatest part of the AQUEOUS, or watery HUMOUR, and communicates by the pupil with a narrow space behind the uvea, or between that and the crystalline humour. These two spaces are termed the TWO CHAMBERS of the aqueous humour.

The third, and last coat of the eye, is the RETINA, so called from its resembling a net, which covers

vers the bottom of the cavity of the eye; it is a fine expansion of the medullary fibres of the optic nerve on the surface of the glassy humour, as far as the ciliary ligament, to which it adheres.

The humours of the eye are three: the first called the **AQUEOUS**, or watery humour, lies in the fore-part of the globe, immediately under the cornea; this humour is thin and of a spirituous nature, for it will not freeze in the greatest frost. This evinces the necessity of a continual supply for this humour, which, in effect, it has. For, if the cornea be pricked and this humour squeezed out, it shall be restored again in the space of ten or twelve hours.

The second, cover'd with a fine coat, is termed the **CRYSTALLINE**; it lies immediately next the aqueous, behind the uvea, opposite to the pupil, nearer the fore-part than the back-part of the globe; it is the least, but the most solid of the humours. Its figure is convex on both sides; its back-side makes a small cavity in the glassy humour in which it lies.

The third, cover'd with a fine coat, is named the **GLASSY HUMOUR**; it has a great resemblance to the white of an egg, and fills all the hind-part of the cavity of the globe. It is larger than the other two, and thicker than the aqueous, but thinner than the crystalline humour.

The last two coats, with the humours, will appear, from the above description, pretty plain to any one, who will take the trouble of dissecting or cutting up a sheep's, or an ox's eye.

The nerves belonging to the eye are 1. the **OPTIC**, making the retina, and entering the eye on that side next the nose *. Then the **THIRD** and **FOURTH**

Cases A N 2
I N 2, 12.
Cases A N

3 4 I N 2,
13, 14.

* The optic nerve (tho' it may appear so in eyes, when taken out of the orbit, and freed from the muscles and fat, as if it were directly inserted into the middle or center of the posterior part of the eye) do not enter it in a place diametrically opposite to the pupil, as some imagined, but in both sides more near the nose, lest the rays coming from the objects should fall upon the nerves, and so be absorbed and lost. For the pupils, in both eyes, are about three inches distant from each other, and

pair, with a branch of the fifth and sixth pair, are distributed upon the muscles, coats, eye-lids, glands, and lachrymal bag; concerning which, see the doctrine of the nerves.

Having considered the appendages and structure of the eye, I shall next enquire a little into the nature of light, the colours formed thereby, and the rules it follows in its motions.

Light is an effect occasioned by the rapid motion of bodies.

The difference of colours arises from the different textures of the luminous bodies; for there are rays that excite in our eyes one sensation, others again, another, different therefrom; and, in short, every different sensation of colour, made in the eye, is occasioned by the different texture of the luminous bodies.

This difference of rays we thus prove. Take a prism, and apply it to a hole made in a window, door, or any other part of a dark room; the rays, which enter the room, thro' the prism and hole, will be divided into different colours, as red, blue, green, yellow, &c. If all the rays, except the red, pass thro' glasses of different forms, or fall upon different bodies, they will still retain their primitive colour. All rays, in dividing, penetrating, and falling upon the surface of objects, follow some general rules, which we must be acquainted with, before we can know the use of the eye; because all the parts of this organ are so situate, as to be subservient to the laws luminous bodies observe in their motions, but this will appear somewhat obscure, if we have not been a little conversant with opticks; however, I will endeavour to make this affair as plain as possible.

and the holes of the skull, thro' which the optic nerves enter the orbits, are little more than one. It must be observed, that this part of the eye, where the nerves enter, is insensible, as is evident from *Mariott's* experiment, in his *Treatise of Vision*. Therefore many objects would be invisible, if the nerves entered directly opposite to the pupil; which disadvantage is obviated by the insertion of the nerve on the inside of the optic axis.

Rays diverge, or separate, from one another, in proportion to the distance of the point from whence they come; this is plain from observing the rays of the sun entering a dark room thro' a small hole; these rays form a cone, or a figure almost like a sugar-loaf, whose vertex, or top, is at the hole thro' which it enters. When the rays fall on a reflecting surface opposing their motion, they observe the same laws other bodies do in falling thereon, making the angle of incidence equal to the angle of reflexion; but in refractions, the laws are different from those of reflections; for rays passing thro' a more, into a less, dense medium, diverge and recede from the perpendicular direction of the plane; but, rays passing thro' a less, into a more, dense medium, on the contrary converge and approach the perpendicular direction. But the rays, passing thro' the air, on a convex glass, will be united in a certain point, on the other side, perpendicular to the plane thereof; whence, having but this direction, they will continue their way without moving to either side, while in that medium.

If rays fall on a paper, in the same order that they come from the object, they will paint that object on the paper. If thro' a hole in a window we receive a ray in a dark room, the objects, where the rays separate, are painted on the paper; but as rays are always removed, it happens that the rays, which come from one point of one object, are mixed with those which come from another. Hence we may account for the defects of sight, and know how to correct them; for an image would appear more distinct, could we collect in one place all the rays that diverge from the same point of that object, which is only to be done by the help of glasses. To make this still plainer, suppose I present a knife or any other pointed instrument to a glass, the point of that knife or instrument will send rays all over the glass; that ray, which falls perpendicularly, passes without turning; but the other rays break in falling upon the glass, and are united at the perpendicular. If the point of the instrument is at the right side, its rays will be united at the left, and so on the contrary. If these rays fall on paper, at
the

the point where they are united, the image will be perfect, and we shall render it more or less confus'd, according as we approach, or recede from the glass.

From what has been said, we may see the reason how objects enter the eye, which is a dark room, where rays enter it at the pupil, and are united in the same manner as when they pass thro' a glass; those, that come from the right-side, are united in a point at the bottom of the eye on the left; those that come from above are united below; those from the left on the right-side, and those from below, above; but they are again reflected back to the surface of the eye, and thus the object appears in its proper form, which would otherwise be inverted, as in the case of seeing objects in a dark room thro' a small hole. Images of objects are in the same manner painted on the bottom of the eye, as they are on paper, when we receive the rays that enter thro' the hole of a window, or a lens. When the rays fall on the aqueous humour, they refract and fall obliquely on the surface of the crystalline; which is more dense than the aqueous; therefore they approach one another in a perpendicular direction, and at last fall on the concave surface of the vitreous humour, which is less dense than the crystalline; therefore again diverge from the perpendicular direction, by which the image is invertedly painted on the retina of the eye, and, again reflected back to the fore-part, it appears in its proper form, as abovementioned. These rays, thus refracted, unite at a greater or less distance, in proportion to the convexity of the aqueous and crystalline humours, or the distance of objects. If the crystalline be a segment of a small sphere, where the rays diverge, the rays will be united thereto; if a segment of a large sphere, its focus or point, where the rays intersect, will be more distant. Rays also unite nearer to, or farther from the crystalline humour, according to the distance of objects. Hence the reason why old people see objects best at a distance; the crystalline dries and flattens by age, and becomes the segment of a large sphere; the
rays

rays will therefore be united behind the retina. To prevent this inconvenience, objects must be placed at a greater distance, by which means the rays will be sooner united, and the objects painted on the retina. We may farther remedy this inconvenience, by using convex glasses or spectacles. Those who are short-sighted, or have protuberant eyes, which are segments of a small sphere, see objects best when placed near; because the rays, falling thereon, unite nearer to the anterior surface of the crystalline humour; by which means the images will not reach the retina; unless the object is placed near thereto, and concave glasses or spectacles made use of.

When an object is in motion, its image moves on the retina; for, when it is at the right-side, its image is at the left, and on the contrary. When we are in a moving vessel, the images of objects move also; and, as we perceive not that we are drawn by the vessel, the objects on shore seem to move; if the retina was in motion, the objects, tho' immoveable, would seem to move; for, by that motion of the retina, the image would change places; hence it happens, in an head-ach, for the artery, accompanying the optic nerve, being swelled, beats strongly against the optic nerve and retina. This pulsation of the artery makes the parts of the retina change place, and consequently the images of objects fall on different points of the retina.

Impressions made on the retina remain a long while; hence, when we move a sling-stone round, we perceive a circle of the sling-stone, for the impression, made by the sling-stone, remains till it is returned there; but we must not attribute the rolling of objects, to the duration of that impression, which remains sometimes a whole day. This swelling and pulsation of the artery, accompanying the optic nerve, serve for explaining a phenomenon, on which a great many trifling disputes have arisen. We sometimes see black points or kinds of flies that hover before our eyes, and hide from us part of the objects; it was believed that these flies were owing
to

to spots in the crystalline humour ; but they, who thus reason, have very little knowledge of opticks, for 1. Objects near the eye unite their rays beyond the retina, therefore form no image ; hence it is impossible we should see spots in the crystalline humour. 2. These spots hide from us the characters when we read, but the spots of the crystalline could never have that effect, for a character sends rays on the whole surface of the crystalline ; if some rays are stopped by these spots, there are others that pass at the side, and which paint the character on the retina. The reason of this phenomenon is, that the artery being either too much distended, or having too great a pulsation in certain parts of the retina, hinders the rays from falling on the nerve, and, at the same time, causes a vibration in the retina ; hence the rays, falling on the optic nerve, must either make no impression, or a very confused one.

The motion of the retina makes us perceive a change in the situation of the object ; but the motion of the axis of the eye causes another change, because we can see objects single or double, for, when the axis looks to the same point, we bring the two images to the same place, therefore we must see but one object ; but when the axis is turned toward two different points, we then see the same object in two places. When, after a full glass of generous wine, the pulsations of the arteries disorder the motions of the eyes, in pushing unequally the nervous juice in the muscles, therefore no wonder we see many objects.

The disorders in the humours change the colour of objects, in the same manner as the disorders of the retina and axis change their situation ; if they be yellow, the objects will appear yellow. This alteration of the humours made some say, that it is impossible for us to see different colours ; but humours are almost the same in all men ; we may then doubt if all see the same colour, according to those who believed that colours did not depend on certain rays ; but when we suppose that certain rays produce certain colours, this doubt must vanish.

The

The comparative structure and anatomy of the eye is very curious; the situation, number, conformation, &c. of this organ, in different animals, being finely and wonderfully adapted to their different circumstances, occasions, and manners of living. In man, and some other creatures, the eye is chiefly situate to look forward, but so ordered, as to take in nearly a whole hemisphere. In birds and some creatures, the eyes are so seated, as to take in nearly a whole sphere, that they may the better seek their food, and escape danger. In others they are so situate, as to see behind them, or on each side, by which they may see the enemy pursuing them. Thus in hares and conies, the eyes are very protuberant, and placed so much toward the side of the head, that their two eyes take in nearly a whole sphere; whereas in dogs, that pursue them, the eyes are set more forward, to look that way more than backward. The head is usually contrived to turn this and that way, chiefly for the eyes; and generally the eyes themselves are moved upward, downward, backward, and forward, for the more commodious reception of the rays. Where nature deviates from these laws, she always makes use of very artful expedients to answer the same end.

S E C T. V.

Of the Ear.

THE EAR, or organ of hearing, is that part which receives the impresson of sounds, and is generally divided into external and internal.

Not having yet a preparation of the internal ear in the wax figures, we are forced to make use of a plate.

Cafe Z.
Fig. 1 4.
A A

The **EXTERNAL EAR**, resembling in some measure a muscle-shell, is that part which lies without the external orifice of the auditory passage in the temple-bone; and the internal is that which lies within the cavity of that bone, and also the parts that bear any relation thereto.

The

The external ear, which is fixed to the temple-bone, by the cartilaginous part of the auditory passage, and two ligaments, has several ridges and cavities, that assist in directing the sounds to the auditory passage; likewise two or three common muscles, called, from their situation, SUPERIOR, ANTERIOR, and POSTERIOR. Fig. 6. A. E. C C.

The AUDITORY PASSAGE is a cartilaginous and bony tube, reaching from the shell to the drum of the ear, and lined with a nervous membrane, which is defended with a thick humour like wax, that comes from the SUBJACENT GLANDS. This tube has a serpentine direction, which is first up and down, backward and forward, to the middle of its course; then crooks and again descends, going from the hind to the fore-part, till it reaches Fig. 1. A C. Fig. 4. C C.

The MEMBRANE, or HEAD of the drum, which is a thin transparent one, of an oval figure, being stretched out like the head of a drum, and set in a bony ridge of the temple bone; it makes an obtuse angle with the upper and back part, and an acute one with the lower and fore-part of the auditory passage. In the middle of this membrane is a depression, made by the adhesion of the hammer; the handle of which is closely joined to its inside. There is likewise a SMALL NERVE, stretched out like a cord upon it. Fig. 1. F. Fig. 4. O.

Behind this membrane is a cavity called the DRUM, in which are contained the bones called HAMMER, ANVIL, STIRRUP, and LENTICULAR BONE, already described in the doctrine of the bones, P. 3, 4. Fig. 4. C 7. Fig. 4, 5. C S--B P--

The hammer has three muscles, one called the EXTERNALUS, to pull it outward with the drum-head; another, termed INTERNALUS, to pull it inward; and the third, named OBLIQUUS, to draw it forward. Fig. 4. d e f f.

The stirrup has one muscle called STAPIDÆUS, which pulls it upward. Fig. 4. g.

There are in the drum, besides these bones, several holes. The first, termed the OVAL hole, leads to the vestibulum; the second, called the ROUND hole, goes to the cochlea; the third is the ORIFICE of the

Cafe K 31. EUSTACHIAN DUCT, which is a communicating canal between the ear and the mouth ; and the fourth goes to the little cavities in the mamillary process of the temple-bone.

Fig. 2, 3, 4. The LABYRINTH, or third part of the ear, is made up of THREE SEMICIRCULAR CANALS, the superior and inferior ; the superior canal joins one of its extremities with another of the inferior canal, and these two open by one hole, but the middle canal opens at each end by itself into

Fig. 3. q r. The VESTIBULUM, or PORCH, which is a cavity making the middle part of the labyrinth.

Fig. 4. 4. The COCHLEA, so called from its resembling the turnings and windings of a snail's shell, is the last cavity of the ear, which is divided by a thin spiral partition into two canals ; the upper opening into the vestibulum, and the lower, by the round hole, into the drum.

The nerves belonging to the ear are the seventh pair of the brain, consisting of two branches, the one soft, and the other hard ; the soft branch is distributed through the labyrinth, but the hard upon the dura mater, drum, and external ear. See the doctrine of the nerves.

The external ear serves to collect the sound, and make its impression stronger on the other parts of the ear. We see when the external ear is quite cut off, that the hearing is much impaired or lost ; and people, thus afflicted, are forced to use an air trumpet, or such like instrument to supply that defect : and this is the reason why brutes, as deer and hares, turn their ears toward that side the noise comes from, when they would hear. Some say that the directions of the sound, insinuating themselves between the foldings of the ear, make there many reflections before they come to the cavity of the ear, so that these foldings and reflections, being repeated, serve to increase the impression on the other organs ; as in a semicircular vault, the rays of the sound, reflecting at equal angles along the circumference of the vault, pass from one end to the other by several great and small reflections.

The

The motion of the muscles of the external ear is scarce perceptible; it seems that their action is to contract or relax the shell, in proportion to the tremulous motion of the air. By means of the obliquity of the auditory passage, the membrane of the drum is defended from the injuries of the air, the surfaces of the conduit enlarged, also reflections are more often repeated, whereby the impressions are made stronger.

The wax, found in the passage, hinders dust and insects from entering the ear; yet if this glutinous humour was suffered to increase in the ear, it would soon grow thick, and stop the vibrations of the ear from approaching the membrane of the drum *.

The auditory passage, ascending and descending, and again ascending in a serpentine progress, makes all the rays unite in the centre of that end the drum is placed in, by which the sound is increased. The several branches of nerves, that distribute themselves on the cartilaginous conduit, are the cause of the sensibility found in this part, which informs the animal of the most minute body that enters the cavity of the ear.

Some think that the membrane of the drum is of little or no service to hearing; for, say they, deaf people, by taking the handle of an instrument in their teeth, can hear the sound of any thing; yet it is of so great consequence, when once torn or pierced, that hearing is for some time afterward preserved, but it quickly grows weak, and is soon quite lost.

This membrane is bent and slacken'd by three small muscles tied to the hammer, which is fasten'd behind this membrane; the external muscle slackens it by putting it in a straight plane; the internal, situate on the surface of the rocky bone, draws it within, and consequently stretches it more than when it is in its natural position. The extension of the drum is made

* M. du Verney, in examining the cause of deafness, found in the auditory passage, about 1 6th of an inch distant from the membrane of the drum, a pellicle pretty thick, before which there had gathered a considerable quantity of dry matter. This he thought to be often the common cause of deafness.

when the two muscles act together, but the relaxation is only made by the action of the external muscle; and the reason for it is, that the insertion of the external muscle, which is opposite to the other, being nearer the head of the hammer, and the insertion of the internal muscle being a little nearer the extremity of the hammer, the force of the traction of the internal muscle is increased by the traction of the external. From what has been said, it is plain, that these muscles act; but the difficulty is to know what makes them act, and what determines them to contract or relax the membrane of the drum, when it is to receive the different impressions of different sounds. Is it the will that makes them act? There is little or no appearance of it, for a sound often surprizes us when it happens unexpected; It is the objects that determine these muscles to contract or relax the membrane of the drum, according to the different impressions. The drum receives the different concussions of the air, and then communicates them to the other parts of the internal ear.

There is reason to believe that the air, collected in the cavity of the drum, being shaken by the vibrations of the membrane, contributes to communicate them to the immediate organ; but it does not appear that this small quantity of air, in motion, has sufficient force to move the rocky bone, or rather the labyrinth; it is therefore highly probable that the vibrations of the drum are communicated to the hammer, the hammer communicates them to the anvil, and the anvil to the stirrup, whose motion at least moves the rocky bone and the labyrinth; as the air, between two lutes laid on the same table, is not capable of communicating entirely the vibration of the cord of one to that of the other; but the cord, that is struck, makes first the wood of the lute to which it is tied tremble, the wood makes the table shake, the table, the wood of the second lute, and this moves the cord which is fastned to it, and which agrees with the other; this is so true, that if we take either of those lutes,

lutes, and hold them in the air, the experiment will not succeed. The nature, mechanism, and articulation of these three little bones, seem to favour very much this conjecture; they are dry, hard, and slender, consequently capable of being moved; the handle of the hammer is, in its full length, fixed to the drum; it is plain then that it cannot be moved without communicating its motions successively to the other bones, since they are articulated with each other, and their articulation, without cartilages, greatly facilitates this communication of motion. It is hard to determine the use of the muscle of the stirrup; we may suppose, that in drawing out a little the base of the stirrup, which is immediately applied upon the oval hole, it stretches more or less in proportion the thin membrane that covers the upper part of the base, and also renders it more capable of receiving the vibrations of the membrane of the drum, to communicate them to the vestibulum and labyrinth. We may yet assert, that in drawing the stirrup, which is flexible, it in some measure stretches and keeps it in a firmer situation, and consequently fits it the better to receive the motions of the hammer and anvil.

There are two conduits at the sides of the membrane of the drum, one terminating at the palate, the other is contained in the cavity of the mastoid protuberance. When the drum is drawn inward, the air, contained in the cavity of the drum, retires into these two conduits, and returns when the membrane is slackened, otherwise the motion of the drum would be stopped by the elasticity and resistance of the air, if it did not find an exit. There is reason to believe that the return of this air, in the cavity of the drum, favours the reduction of the drum in its natural situation.

The canal, going from the palate to the ear, furnishes a fresh supply of air, to renew, from time to time, that contained in the cavity of the drum; and that the cold of the external air might not hurt the parts of the internal ear, the air, running thro' the cavity of the nostrils, and along this canal to the cavity of the drum,

drum, receives the necessary and convenient modifications to the state of those parts that it goes to, without losing its elastic force, which makes it fit for the intended uses. Wherefore the air, that comes from the lungs, mixed with impure vapours, will not so easily enter this canal, the orifice whereof being so disposed, as to give a freer passage to the air that enters the nostrils, than that which comes from the lungs. It is a general opinion, that some deaf people can hear the sound of stringed instruments by means of this canal; and if their deafness be owing to the drum's ceasing to act, we ought not to be surprized, if the vibration of the external air communicating, as it does, with that included in the cavity of the drum, that these persons do hear the sound of an instrument.

To shew that the motion of the air, in the barrel of the drum, is not sufficient to make deaf people hear the sound of an instrument, we must observe that they are obliged to hold the handle of an instrument in their teeth; otherwise they would not hear at all, or at least they would not hear so well. We may easily conceive, that when the teeth are moved, the motion is communicated to the jaw-bones, next to the temple-bones, and then to the bones of the ear; for they, who are not deaf, will hear the sound of an instrument better and stronger, when they hold the handle in their teeth, and stop their ears. There are some deaf people, who hear better when we speak to them above their heads; we think it probable, that when the skull is moved in these persons, the rocky bone, and all the other parts, are moved successively.

Having said that the oval hole is shut up by the base of the stirrup, one of whose sides is cover'd with a membrane, and whose base is very thin, having received the motion of the two others, and of the air contained in the cavity of the drum, can easily communicate them to the vestibulum, and to the air contained there, then to the shell, and, lastly, to the three semicircular canals. The round hole is shut up by a membrane, resembling almost the membrane of the drum; we may suppose that it receives the motion

tion of the air contained in the cavity of the drum, and that it communicates itself to that air, contained in the inferior part of the cochlea, which being in that place much pressed, and having no exit, is capable of moving strongly the spiral plate; and thus it is that the vibrations of the air approach the immediate organ of hearing, of which we are now going to treat.

This organ goes by the name of labyrinth, which, being contained in the rocky bone, consists of two chief parts, viz. the cochlea and vestibulum, with its three semicircular canals. The cochlea makes a part of the immediate organ; its composition is a convincing proof of this; for, first, the spiral plate, which makes the principal part, is hard, dry, thin, and brittle; these are fit qualities for vibrations. 2. This plate lies not within the semi-oval spiral canal, but is stretched, adhering on one side to the nuel, and on the other to a very fine membrane joining the surface of this canal; so that this situation of the spiral plate is so very favourable to the disposition of being easily moved. 3. The spiral plate divides, by means of this membrane, the whole conduit of the spiral canal, as into two flights of a stair-case, in the figure like a snail, built upon the same nuel, the upper of which has no communication with the under. The round hole opens into the lower, which has no communication with the upper flight, nor with the vestibulum; so the air, shut up in the lower flight, is moved, both by the concussions of the oval hole, and by the air contained in the upper flight of the semi-oval canal, which is also moved, both by the motion of the air contained in the vestibulum or porch, with which it communicates, as also by the air included in the inferior flight of this canal; the spiral plate being thus struck at both sides, its motion ought to be very strong and sensible. 4. The spiral figure of this plate is an argument, strong enough to maintain what has been advanced, for, in making twice and a half the circumference of the nuel, it receives the different vibrations of the air in many places;

ces; and this mechanism is observed in the tongue, the nose, &c. 5. A considerable branch of the soft branch of the auditory nerve, having reached the base of the cochlea, divides in many small branches, which, going thro' the little holes that pierce the nuel, distribute and lose themselves in the several windings of this spiral plate. In short, this plate is not only capable of receiving the vibrations of the air, but its structure ought to make us think that it can answer all the different characteristics; for being longer at the beginning of its first revolution, than at the extremity of the last, where it terminates as in a point, and its other parts diminishing in proportion, we may assert, that the larger parts, being moved without the other, are only capable of the slowest motions, which consequently answer the low sounds; and, on the contrary, the narrower parts being struck, the stronger and quicker is their motion, and consequently answer to the sharp sounds; in the same manner that the largest parts of a spring of steel make motions slower, and answer to the slow sounds, and the straightest of them make quicker, and consequently answer to the sharp sounds.

Some say, that the vestibulum and three semicircular canals only serve to encrease the motion of the air, others, to lessen it; I think they make up a part of the immediate organ, for the following reasons.

1. Birds have only three crooked conduits, in form of a semicircle, and a fourth, which is straight and shut at one end, but opens with the rest in a cavity common to them, and is in place of a vestibulum. Fish have likewise these three canals, but the former nor the latter have no cochlea, yet both hear; hence it is plain, that the semicircular canals are the immediate organ of hearing in birds and fish. Why then may not they be of the same use in man, since the structure is the same in man, as in these animals; at least these semicircular canals, in man, ought to make a part of the immediate organ? Therefore this organ is composed of two essential parts.

2. I doubt not but the soft branch of the auditory nerve conveys the impression of the sound to the brain;

now

now there are two branches of it which enter the cavity of the vestibulum, and extend themselves in threads and membranes that line these semicircular canals; whence this part of the labyrinth makes also a part of the immediate organ.

3. From the structure of the vestibulum, and the three semicircular canals, we may reasonably think that the impresson of sounds increases and fortifies itself in its way, and consequently is more able to move the nerves which are there spread. By the communication of the hard branch of the auditory nerve, with the branches of the fifth pair, which are distributed upon the parts that form the voice, we may explain the communication between hearing and speech; the vibration of the nerves of the ear communicates with the nerves of the fifth pair; which makes the fluids or spirits, that run from the brain into these nerves which tend to those parts that form the voice, so dispose their muscles; that answering the impresson the voice has made in the brain, they put them in such a condition to form a voice equal to what has been heard. It is said, that this is the reason men and birds excite each other to sing, and men born deaf are likewise dumb. It is also thought, that it is by the communication of the second vertebral pair with the external ear, that at the least noise we turn our head, and the body finds itself disposed to make different motions, according as the sound is agreeable or disagreeable; and as these nerves communicate with those of the heart and lungs, it is owing to the former reason, that we find the same alteration in the pulse and respiration.

SECT. VI.

Of the Mouth and Tongue.

THE TONGUE is the chief organ of TASTE and SPEECH; concerning which we must consider all the parts of the mouth subservient to its function, namely, the salival glands, tongue-bone, gums, palate, lips, uvula, and tonsills.

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The glands, that serve to secrete or separate the saliva or spittle, are

Cases A 39 I. The PAROTIDES, made up of a number of small
B 22 E 43 glands, are situate one in each side, between the
K 33 N 18. ear and the angle of the lower jaw, from which proceed
Cases A 40 several small ducts that unite and form ONE CANAL
B 23 E 44 about three inches in length, and one ninth of an
N 19. inch in breadth *; from thence it passes transversely
above the masseter muscle along the middle of the
cheek, perforates the buccinator and membrane of
the mouth, near the second or third grinder, and
there, by a small opening, discharges in the mouth a
large quantity of spittle †.

Cases A 37 B 15 C 2. The MAXILLARY GLANDS, being of the
24 E 42 K 21 compound kind, are one in each side, situate in the
N 21 X 10. inside of the angle of the lower jaw; each of which
Cases A 38 has a PARTICULAR CANAL ‡, composed of several
C x X 11. lesser ones; it is smaller and longer than the former.
This pipe opens into the mouth under the tongue, some-
times by one, two, or three orifices.

Cases C r 3. The SUBLINGUAL GLANDS, also of the com-
W 40. pound kind, are one on each side, situate under the
tongue. These separate the salival juice, and empty
themselves by small canals that open into the mouth
on both sides, between the tongue and the gums. Be-
sides these, there are a great many more glands disco-
vered by Heister and others, for which see p. 278 of
his Compendium.

* This canal was discover'd by *Steno*, anno 1660. Hence called the *Stenonian* duct.

† Several chirurgical operations demonstrate, that a large efflux of saliva runs along this canal into the mouth while eating. And *Fabricius ab Aquapendente* first observed, in wounds of the cheeks toward the ear, a small hole, thro' which, while the patients were eating, run a large quantity of clear water, like tears trickling down the cheeks; how, and from whence it proceeded, he confesses he knew not; for the salival ducts were not then discovered. *Helvetius* also mentions a soldier, who had this salival duct cut by a wound he received in the cheek, and, when eating, would have wetted several napkins with the saliva that run from this duct.

‡ Called from its discoverer, *Wharton*, as several think, the *Wharsonian* duct.

The TONGUE-BONE has been already described in Cases A B C the doctrine of the bones, p. 5. but because of its E S T g. connection with, and use to the tongue, requires here a little more consideration.

This bone so coheres with the root of the tongue, that it is situate between it and the wind-pipe, and is moved along with the tongue. It is connected by muscles and ligaments with the tongue, larynx, and the styloide processes of the skull; also by muscles with the lower-jaw, shoulder, collar, and breast bone.

It has five pair of muscles, for allowing it different motions with the tongue. The first pair is the MYLO-HYOIDÆUS, which pulls it upward, forward, and to either side, according to the direction of its fibres. Cases S T 6.

The second pair is the GENIO-HYOIDÆUS, which pulls it upward and forward. Cases S T 7. The third pair is the STYLO-HYOIDÆUS, which pulls it to one side and a little upward, when both act together. Cases S T 9.

The fourth pair is the CORACO-HYOIDÆUS, which pulls it obliquely downward; and the fifth pair is the STERNO-HYOIDÆUS, which pulls it directly down. Cases K 15 T 16.

This bone is a firm base to the tongue, assists its motion in swallowing, and affords several muscles a fixed point. Cases K 17 T 14 W 17.

The LIPS, consisting chiefly of a fleshy substance, are covered externally with the common teguments of the body; on the inside, with the common lining of the mouth, under which are situate, both in the upper and lower lip, the miliary and lenticular glands *. The upper lip, under the nasal partition, has a ligament; and the lower, at the roots of the cutters, somewhat of a particular ligament. The lips are very serviceable in speaking, eating, and drinking.

The GUMS consist of the common membrane of the mouth, and the periosteum of both jaws, to which they have a firm adhesion. They are plentifully fur-

* In the red part of the lips, when stripp'd of the scarf-skin, and macerated for some time in water, are exhibited to view a vast number of papillæ; hence the reason of their being so sensible.

nished with an infinite number of blood-vessels ; hence the cause of their redness. They serve for covering the jaw-bones, and fastening the teeth.

Cases C 11
K 27.

The PALATE, or roof of the mouth, is almost of the same structure, but plentifully stored with glands, especially in the hind-part near the uvula, where this membrane is pendulous like a curtain, hence called the fence. These glands separate by a great many openings a slimy liquor, for smoothing, making slippery the jaws, and promoting the affair of swallowing.

This membrane defends the palate bones from putrefaction ; likewise, by its fence, prevents whatever is taken in at the mouth, from rushing into the nostrils

Cases C 13
K 28.

The UVULA is a long, round, soft, smooth body, like the end of a child's little finger, or an inverted cone, hanging from the roof of the mouth at the extremity of the passage, coming from the nose above the larynx between the tonsils. The substance of the uvula is fleshy, and surrounded by the glandulous membrane of the mouth. It has two membranous ligaments, that serve to connect it with the bones of the palate ; likewise four pair of muscles, tho' reduced by some to two pair, for moving it in all its directions, which are the PTERYGO-STAPHILINUS EXTERNUS, or the first pair, which pulls it back ; and the PTERYGO-STAPHILINUS INTERNUS, or the second pair, which pulls it forward. The use of the uvula is not yet fully known ; however, it seems designed to give the voice a finer turn, and in some measure prevent drink, &c. from entering the nostrils.

Case K 29
30.

Case C 14.

The TONSILLS are two glandular bodies of a reddish colour, resembling in figure an almond-shell, and lying in the interstices, between the two lateral half arches of the partition of the palate, one on the right, the other on the left side of the base of the tongue. These bodies serve to secrete a slimy humour for lubricating the jaws, which they discharge thro' several visible holes of an irregular figure*.

* To see the structure of the tonsils, we must examine them in clear water, after they have been washed in luke-warm water.

The TONGUE is an oblong, soft, fleshy body, Cafes C 12 whose form and situation are sufficiently known, and K 20. whose use is to be the organ of taste, and the chief instrument of speech, deglutition, suction, &c. It is connected with the tongue-bone, lower-jaw, styloide process, pharynx, larynx, and other adjacent parts, by muscles and membranes. It has two ligaments. 1. The frænulum under the point, in whose root Wharton's salival ducts enter the mouth. 2. A membranous one *, whereby the tongue is connected with the lower jaw, tongue-bone, larynx, and epiglottis. In the middle of the tongue is a line dividing it externally, as it were into two equal parts.

The tongue is chiefly composed of minute muscles, nervous coats, fat, glands, and vessels. In the superior and posterior part it has, beside the sublinguals, a great number of miliary glands, and a hole often visible.

It has three pair of proper muscles; the first pair is the Cafes GENIO-GLOSSUS, which pulls it out of the mouth; C 22 W 23 the second pair is the CERATO-GLOSSUS, which pulls X 5--Cafes the tongue to one side; and the third pair is the C23 W 25 X SYLO-GLOSSUS, which pulls it up †. 6--Cafe X 9.

The tongue has three coats; the first is a continuation of the common membrane of the mouth; this forms pyramidal, globular, and porous scaths, for the reception of the nervous papillæ of the third membrane. The second is a reticular membrane, consisting of a fine net, visible only in the superior part of the tongue, that transmits thro' its holes the nervous papillæ. The third is the nervous papillary coat, that contains the NERVOUS PAPILLÆ, which are either Cafe C 12. funguous or headed, resembling in figure snails horns, and furnished with little holes capable of contraction or dilatation. These papillæ arise from this last coat and the nerves of the tongue, pass thro' the little holes in

* This membranous ligament is sometimes continued to the tip of the tongue, which then prevents children from suckling; therefore in such a case the ligament should be cut.

† Some add the basio-glossus, which is only a part of the cerato-glossus, and the myo-glossus, which is another part of the mylo-hyoidæus, but these, which are only parts, need not be made particular muscles.

the reticular membrane, terminate in the cases of the exterior coat, and form the principal organ of taste *.

S E C T. VII.

Of the Nose.

Cases B 25
C 10.

THE NOSE, or organ of smell, is divided into external and internal. The external part is covered with the scarf-skin, skin, some fat and muscles; as for the latter, see the doctrine of the muscles. Its upper part consists of two bones, closely united on their upper side; for which, see the doctrine of the bones. Its lower part is made up of four cartilages, the FIRST TWO of which are fixed to the inferior ends of the nasal bones; they are also joined together on the upper side, and are pretty broad; but as they approach the tip of the nose, they grow thinner and softer. The other two lie on the inferior extremities of the two first, to which they are fixed by a membrane, and are called the sides of the nose. The cavity, made by these bones and cartilages, is divided in the middle into two nostrils by a PARTITION, the upper end of which is bony, and the inferior cartilaginous. The upper end of this cavity divides into two, one of which ascends, and the other descends, and opens behind the palate, by which we breathe thro' our nostrils. At the lower end of this cavity are two small holes, that open into one; in a skeleton immediately behind the incisores, or cutting teeth, but they neither enter the mouth in living nor dead subjects, because of their being closely shut up by the membrane of the palate, and therefore the use commonly ascribed to them, namely, that they transmit a mucous or slimy matter, from the nostrils to the mouth, is built upon a false foundation.

* It is plainly proved by experiments, that these papillæ are the organ which receives the impressions of taste from objects applied thereto; and that the other parts of the mouth, tongue, jaws, and palate do not act therewith; but perhaps those that lie in the cheeks, next to the place where the grinders meet, may be concerned herein.

This cavity is lined by a pretty thick glandulous membrane, its glands separate slimy matter into the nostrils. On the lower end of this membrane grow several hairs, which, with the slimy matter, stop extraneous bodies from ascending too far into the nostrils.

The internal part of the nose is the immediate organ of smell, and is made up by the help of several bones, furnished with sinuses, cells, inequalities, or eminences, of which already in the osteology, that serve for increasing the cavity of the nose, and enlarging the expansion of a fine membrane, with which they are covered. On this membrane the olfactory nerves are spread, with a branch of the fifth pair, united with a branch of the sixth pair, of which, see more in the doctrine of the nerves; likewise several glands, that separate a humour for moistening the nose, and stopping the exhalations of odoriferous bodies. It has several canals belonging to it. The first and second are the lachrymal; the third and fourth are the frontal sinuses; the fifth and sixth from the maxillary bones; the seventh and eighth from the cells of the spongy bones; and the ninth and tenth from the sinus in the sphenoid bone; likewise several holes, of which already, with their uses, in the osteology. The nose, beside being the organ of smell, serves to assist respiration and the voice, to secrete a slimy humour, divert the humour of the eyes, and, in a great measure, to contribute to the gravity and ornament of the face.

SECT. VIII.

Of the Sense of Feeling, Tasting, and Smelling.

THE cutaneous papillæ constitute the ORGAN OF FEELING, which are the villous extremities of the nerves of the skin, every where covered by the scarf-skin, as in the palms of the hands, soles of the feet, and especially in the extremities of the fingers, where this sense is most exquisite, as has been shewn when treating of the skin.

The touch then is occasioned, if the end of the finger be applied to examine an object, when the papillæ

pillæ are extended by the attention of the mind, and gently rubbed upon the surface of the body. Thus a certain motion is received by these papillæ, the effect whereof is conveyed to the common sensory, and excites in the mind the idea of hot, cold, moist, dry, soft or hard, smooth; rough or figured, of a body in motion or at rest; of distance, tickling, itching, or pain *.

The SENSE OF TASTE is very like that of feeling; for the nervous papillæ of the tongue, being affected by relishing bodies, communicate the impressed motion thereof to the common sensory, and so excite in the mind the idea of salt, acid, alkali, sweet, vinous, spirituous, bitter, aromatic, hot, sharp, austere, or tastes variously compounded of these †.

So in like manner the SENSE OF SMELLING is occasioned, for when odoriferous steams, contained in the air, are strongly drawn in thro' the nostrils and pressed against the olfactory fibres; the figure of the nose and the position of its bones opposing them, and thus acting upon them, which action, being communicated to the common sensory, excites the idea of the smell of acid, alkali, aromatic, putrid, vinous, &c. ‡

* Hence it appears why we feel pain when a part is rubbed, or the scarf-skin scalded, worn, or burnt; or why the feeling is lost when the scarf-skin is become thick, hard, callous, or spoiled by a cicatrix; what is the cause of that surprising and uneasy sensation, proceeding from trembling; also, why, at the extremities of the nails, fixed to the skin, and at the roots thereof, pain is so violent; and lastly, why the sense of feeling is most acute where the nails grow, and where the furrows of the skin are spiral.

† Hence it appears why the same objects occasion different tastes, according to the difference of the age, temper, sex, disease, custom, or things which had before possess'd the organs. From hence we may likewise understand, why what affects the taste briskly, is painful, as salt, aromatic, or spirituous things, if applied to the naked nerves of the tongue, when excoriated; and, why things, that relish well or pleasantly, are refreshing; and lastly, why water, smooth oils, and earth, without salt or oil, are insipid.

‡ Hence it appears that the sense of feeling is the most common, and that the other senses are only different species of this sense. Hence also it appears what difference or affinity there is between smelling and tasting, or their objects; why smell in a moment fetches one to life; and why they sometimes act as medicines or poisons, and occasion various kinds of distempers and death; and why in different persons, different smells have different effects. A great deal might be said under this section, but this will suffice at present to give the young anatomist a faint idea of these senses.

M Y O L O G Y ;

O R, T H E

Doctrīne of the M U S C L E S.

A Muscle is the instrument of motion, or a part of the body designed especially for performing voluntary motion, chiefly consisting of fleshy and tendinous fibres; furnished with arteries, veins, nerves, and lymphatics; which are all wrapp'd up in one common membrane.

A muscle is divided into a body and two extremities; the body is called the belly, and the extremities, especially the white parts, the tendons. The extremity, where it arises, is termed the head, beginning, origin, or first point; and the end, the tail, moveable point, and often the tendon; which, if membranous and broad, goes under the name of an *APONEUROSIS*. Cases B F 1*.

Muscles conspiring in one action, as those which bend and extend the arm, are called partners, or fellow actors; when muscles perform a contrary action to each other, as the extenders of any part to that of the benders, such muscles are then termed antagonists.

Both these muscles, acting together, render the part fix'd and immoveable, which action goes under the name of a tonic motion.

The muscular fibres, according to the diversity of the action for which they are designed, are either straight or oblique, transverse, round or spiral, &c.

Some muscles consist of a single and uniform tract of fibres, and these are called simple; but others are composed of a various, and often a contrary course of fibres, and even of different small muscles; according as *Steno*, *Borelli*, and *Lower* have demonstrated; and the more such fibres join in one muscle, the thicker and stronger is that muscle.

Muscles receive their names either from the fix'd and moveable point of the muscle together, or from the fix'd or moveable point alone; the use which they perform, their figure or similitude, place or situation, their magnitude, or from their other qualities, as will more fully appear from a particular consideration of the muscles.

Muscles in some subjects vary, some are wanting, and others are added in different manners; so that we ought to regulate ourselves by what generally happens, and not render the common cases obscure, for a few extraordinary ones, which ought to be considered in the same manner, as that of six fingers, eleven or thirteen ribs, &c.

To understand the uses and contrivance of each muscle in particular, we ought to consider its situation in general, external conformation, insertions, particular situation, direction, lateral connection, relation, and composition of its parts. We must likewise enquire into the disposition of the neighbouring muscles, for producing simple, and how these, at a greater distance, produce compound motions.

Muscles, fixed only to bones, act as so many powers applied to levers. The action of a muscle in general, or the mechanism of this action, chiefly consists in contracting its belly or fleshy part, whereby the extremities are brought nearer each other, and consequently the parts are moved, to which these extremities are fixed. The tendons always retain the same length, and follow the motions of the other part.

The principal phenomena of muscular action are these. The fleshy part is harder and more swell'd in time of action than inaction, as may be perceived by touching in both states. The hardness of this swelling increases in proportion, as the motion is continued, as is evident by the touch. And it likewise increases by adding to the weight or resistance of the part moved, tho' its situation continues not to be changed.

This action in several muscles may be proportioned to the velocity and space of motion, may be increased and diminished, accelerated, retarded, or stopped; and
may

may be made to cease in an instant, and again produced in another. The fibres of a muscle, during its contraction, are bent thro' their whole length, or formed into small fine folds, in alternate opposite directions, as may be seen in animals immediately killed.

When several muscles are fixed to any moveable part, they are all in a state of contraction in every motion of that part; but they are not all in the same degree of action, because the principal movers act more than the antagonists or directors, or collateral muscles, if any belong to the part. This co-operation is perceived by touching the muscles, when the part they belong to is moved with a considerable force.

There are some motions which entirely depend on the relaxation of the muscles, that lie on the opposite side; as in supporting the body by one hand resting on a low table, the joint of the elbow being in that state suffered to yield to the weight of the body, or to bend sometimes slow and sometimes fast; for if we feel with the other hand the bender and extender of the fore-arm, the first will be relaxed, and the latter contracted. Hence the action of a muscle in general consists, as much in the relaxation of the moving fibres, when contracted, as in the contraction of them, when relaxed, whether this action be performed successively or instantaneously *.

We will here give the particular uses of the muscles, by proceeding from the head to the foot.

N. B. Most of the external muscles are marked with red figures.

* I do not mean those motions beyond our reach, which we can only determine in part, as those of respiration; or not at all, as those of the heart.

Of the Muscles.

The SKIN OF THE HEAD has four * muscles.

Case W 1.

Muscles.

Uses.

turned down with the several coverings of the skull.

Frontales, two,

pull up the skin of the fore-head.

Occipitales, two,

pull up the skin of the hind-head.

The EYE-BROWS have one muscle.

Case B 1.

Corrugator †,

knits the eye-brows.

The EYE-LIDS have one pair of muscles, of which already, in p. 71.

The EYE has six muscles, of which already, in p. 72.

The NOSE has three pair of muscles.

Case B 2.

Elevator,

pulls up the nose.

3. Dilator,

widens the nostrils.

4. Depressor,

contracts or compresses the nostrils.

The EXTERNAL EAR has sometimes two, and sometimes three small muscles, of which already, in p. 81.

The INTERNAL EAR has three muscles according to some, and according to others four, of which already, in p. 81.

The LIPS have five pair and one single muscle.

Case N 10.

Elevator labij superioris,

} pulls up the upper lip.

11. Elevator labij inferioris,

} pulls up the lower lip.

15. Depressor labij inferioris,

} pulls down the lower lip.

12. Elevator labiorum communis,

} pulls up both lips.

16. Depressor labiorum communis,

} pulls down both lips.

14. Sphincter labiorum,

draws both lips together.

The CHEEKS have one pair of muscles.

Case N 13.

Buccinator,

thrusts the meat between the teeth.

Case B 15.

Quadratus genæ,

pulls down the cheeks and skin of the face.

* That very accurate and indefatigable anatomist, Dr. Douglas, makes these four muscles one digastric muscle, which he calls occipito-frontalis. Morgagni observed the occipital muscles wanting in some subjects, and sometimes so very thin, as scarce to be perceived, and sometimes larger than usual, and sometimes divided as it were into two; hence Sanctorini made in both sides two occipital muscles.

† Douglas calls this the true frontal muscle, Heister makes it only a part of the frontal muscle, but Sanctorini will have it a part of the orbicular.

The LOWER JAW has six pair of muscles.
Muscles. Uses.

- Cafe N 2. Temporalis, pulls up the jaw.
17. Masseter, pulls the jaw upward, backward, and forward.

- Cafe S 8. Digastricus, } pull down the jaw.
Cafe B 14. Quadratus genæ, }

- Cafe M N 9, Pterigoidæus internus, pulls the jaw to one side.

11. Pterigoidæus externus, pulls the jaw forward.

The UVULA has two pair of muscles, of which already, in p. 92.

The TONGUE-BONE has five pair of muscles, of which already, in p. 91.

The TONGUE has three pair of muscles, of which already, in p. 93.

The PHARYNX, or upper part of the gullet, has four pair of muscles.

- Cafe M N 9, 10. Oesophagæus, contracts the pharynx.

7. Cephalo-pharyngæus }
8. Spheno-pharyngæus, } dilate or widen the pharynx.
9. Stylo-pharyngæus, }

The LARYNX, or upper part of the wind-pipe, has seven pair of muscles, of which already, in p. 58,

The HEAD has ten pair of muscles.

- Cafe T 17. Mastoidæus, } bend the head forward.
Rectus major anticus, }

Rectus minor anticus, nods the head forward.

- Cases S T 19. Splenius, } pull back the head.
20. Complexus, }

- Cafe N 39. Rectus major posticus } nod the head backward.
38. Rectus minor posticus }

41. Obliquus superior, } turn the head about.
40. Obliquus inferior, }

37. Mastoidæus lateralis, nods the head to one side.

The NECK has five pair of muscles.

- Cafe N 36. Scalenus, } bend the neck forward.
Longus, }

42. Transversalis, } pull the neck backward.
Cafe C y. Spinalis, }

- Cafe N 43. Interspinales colli.

The muscles of the CHEST, or those belonging to respiration, are

Muscles.	Uses.
Cafe A 1. Diaphragm,	already described in p. 45.
Cafe W 2, 2, &c. Intercostales externi,	} dilate or widen the cavity of the chest, by pulling up the ribs.
Cafe F 4, 4, &c. Intercostales interni,	
Cafe B 23. Subclavius,	
Cafe W 3, 3. Serratus major anticus,	
Serratus posticus superior,	} contract the cavity of the chest, by pulling down the ribs.
Cafe W 4. Serratus minor anticus,	
Triangularis,	
Serratus posticus inferior,	
Cafe W N. Sacro-lumbaris.	

The BACK has three pair of muscles.

Longissimus dorsi,	} extend the back, and keep the trunk of the body erect.
Semispinalis,	
Transversales dorsi,	

The LOINS have four pair of muscles.

Cafe C x. Spinalis,	} extend the loins.
z. Transversalis lumbarum,	
Cafe X 6. Quadratus,	} bend the loins.
Psoas parvus,	

The BELLY has five pair of muscles, of which already, in p. 15, 16.

The TESTICLES have one pair of muscles, described in p. 25.

The PENIS, or YARD, has two pair of muscles, see p. 27, 28.

The CLITORIS has one pair of muscles, described in p. 29.

The BLADDER has two muscles.

Cafe E 25. Detrusor urinæ,	contracts the bladder, and so forces out the urine.
Cafe D N 2, Sphincter vesicæ,	contracts the neck of the bladder, and thereby hinders the continual efflux or going out of the urine.
49.	The

The ANUS, or EXTREMITY of the STRAIGHT GUT, has three muscles, already described in p. 19.

The SCAPULA, or SHOULDER BLADE, has five muscles.

Muscles.

Uses.

- | | | |
|------------|-------------------|--|
| Cafe F 6. | Elevator, | pulls up the shoulder-blade. |
| Cafe N 44. | Trapezius, | pulls it upward, backward, and downward. |
| | 47. | Rhomboides, |
| | | pulls it backward. |
| Cafe W 4. | Pectoralis minor, | pulls it forward. |
| | 3. | Serratus anticus major, |
| | | pulls it forward and downward. |

The ARM-BONE is moved by nine muscles.

- | | | | | |
|------------|---------------------|---|-------------------------------------|--------------|
| Cafe B 26. | Deltoides, | } | pull up the arm. | |
| Cafe C 16. | Supra-spinatus, | | | |
| Cafe W 12. | Coraco-brachialis, | } | pull the arm backward and downward. | |
| | 7. | | | Teres major, |
| Cafe N 48. | Latissimus dorsi, | | | |
| Cafe B 27. | Pectoralis major *, | | pulls the arm forward. | |
| Cafe C 17. | Infra-spinatus, | } | pull back the arm. | |
| Cafe W 11. | Teres minor, | | | |
| Cafe C 22. | Subscapularis, | | | |

The FORE-ARM has six muscles.

- | | | | |
|------------|----------------------|---|--------------------|
| Cafe W 15. | Biceps †, | } | bend the fore-arm. |
| Cafe B 30. | Brachiaëus internus, | | |

Longus

* The action of this muscle is assisted by the coraco-brachialis, and the action of the deltoides is assisted by the superior part of this pectoral muscle, which part is, as it were, a distinct muscle.

† About the bending of the arm, where this muscle begins to grow tendinous, it sends off an aponeurosis, which covers all the muscles on the inside of the cubitus; its fibres decussate those of another subjacent tendinous membrane. As for the use of this external tendon, it seems designed not only for the more advantageous elevation, or bending of the cubitus, which more easily moves it, by how much the more it recedes from the center of its motion at the lower part of the arm-bone, and approaching to its other extremity; but likewise strictly including all the external muscles, whether belonging to the fore-arm, wrist, or fingers; it thereby corroborates them in performing these strenuous actions they are necessarily employed in. This latter use was first suggested, by observing those artificial leathern bandages, which some laborious mechanics make use of, by adapting them to the bellied part of the muscles of the cubitus, among whom, turners, and especially those who use the rasp, in making cane-chair frames, as they are commonly called, like a double screw, are often obliged to this art, In bleeding, the

	Muscles.	Uses.
Cafe W 17.	Longus,	} extend the fore-arm:
18.	Brevis,	
19.	Brachiaëus externus,	
20.	Anconæus,	
	The RADIUS, OR SECOND BONE of the FORE-ARM, has four muscles.	
Cafe W 21.	Rotundus,	turns the fore-arm, wrist and hand, inward; likewise the palm of the hand downward.
Cafe E 5.	Quadratus,	turns the fore-arm, wrist and hand, inward.
Cafe W 23.	Supinator longus,	} turn the fore-arm and palm of the hand, outward and upward.
Cafe E 4.	Supinator brevis,	
	The WRIST has four muscles.	
Cafe W 24.	Flexor carpi radialis,	} bend the wrist and hand.
25.	Flexor carpi ulnaris,	
26.	Extensor carpi ra-	} extend the hand and wrist.
27.	dialis,	
	Extensor carpi ul-	
	naris,	
	The PALM OF THE HAND has two muscles.	
Cafe C 24.	Palmaris longus,	contracts the palm of the hand, and so assists in grasping.
25.	Palmaris brevis,	makes the palm of the hand hollow.
	The FINGERS have thirteen muscles.	
Cafe W 31.	Perforans,	bends the last or upper joints of the fingers.
30.	Perforatus,	bends the second or middle joints of the fingers.
33.	Lumbricales,	assist in bending the first or lowermost joints of the fingers.
32.	Extensor digitorum communis,	} extends the first and second joints of the fingers.
Cafe A 31.	Interossei externi,	pull the fingers from the thumb.
	Interossei interni,	pull the fingers to the thumb.

the directions of those external tendinous fibres ought to be observed, by directing the lancet according to their length, to avoid too great a division of them, which often causes those ill symptoms that remain after that so commonly practis'd operation by bold blood-letters. *Cowp. Myotom. Reformat* p. 147.

The THUMB has eight muscles.

Muscles.

Uses.

Case W 35.	Flexor tertij internodij pollicis;	}	bends the third or uppermost joint of the thumb.
36.	Flexor secundi internodij,		bends the second or middle joint.
	Flexor primi internodij,		bends the first joint.
37.	Extensor primi internodij,		extends the first joint.
38.	Extensor secundi internodij,	}	extends the second joint.
39.	Extensor tertij internodij,		extends the third joint.
40.	Abductor,		pulls the thumb from the fingers.
41.	Adductor,		pulls the thumb to the fingers.

The FORE-FINGER has two muscles.

Case B 47.	Extensor,	extends the fore-finger.
48.	Adductor,	pulls the fore-finger to the thumb.

The LITTLE FINGER has two muscles.

Case W 43.	Extensor minimi digiti,	}	extends the little finger.
44.	Abductor,		pulls the little finger from the rest.

The THIGH has sixteen muscles.

Case L 19.	Psoas magnus,	}	bend the thigh.
20.	Iliacus internus,		
Case B 50.	Pectinæus,	}	extend the thigh.
Case W 47.	Glutæus maximus,		
48.	Glutæus medius,		
49.	Glutæus minimus,		
50.	Triceps,		move the thigh inward.
Case B 50.	Iliacus externus,	}	move the thigh outward.
	Gemini,		
Case C 42.	Quadratus,	}	moves the leg obliquely outward.
Case L 21.	Obturator externus,		
	Obturator internus,		

The LEG has eleven muscles.

Case W 53.	Seminervosus,	}	bend the leg.
52.	Semimembranosus,		
54.	Biceps,		
51.	Gracilis,		
Case F 26.	Membranosus,		

P

Vastus

	Muscles.	Uses.
Cafe W 56.	Vastus externus,	} extend the leg.
57.	Vastus internus,	
55.	Rectus,	
58.	Cruræus,	
59.	Sartorius,	moves the leg obliquely, or brings one leg and thigh cross the other.
60.	Poplitæus,	moves the leg obliquely outward, and assists in bending it.

The FOOT has eight muscles.

Cafe W 62.	Tibialis anticus,	} bend the foot.
63.	Peronæus anticus,	
64.	Gastrocnemius ex-	} extend the foot.
	ternus,	
65.	Gastrocnemius in-	
	ternus,	
	Plantaris,	
Cafe G 12.	Solæus,	
Cafe W 67.	Tibialis posticus,	pulls the foot inward.
68.	Peronæus posticus,	pulls the foot outward, and bends it a little.

The four lesser TOES have fifteen muscles.

Cafe W 74.	Lumbricales,	bend the first or inferior joints of the four lesser toes,
73.	Perforatus,	bends the second or middle joints of the four lesser toes.
72.	Perforans,	bends the third or superior joints of the four lesser toes.
70.	Extensor longus,	} extend all the joints of the four lesser toes.
71.	Extensor brevis,	
Cafe W 75.	Interossei externi,	pull the toes toward the little one.
	Interossei interni,	pull the toes toward the great one.

The GREAT TOE has six muscles.

Cafe W 78.	Flexor longus,	bends the last joint of the great toe.
79.	Flexor brevis,	bends the second joint of the great toe.
76.	Extensor longus,	extends the last joint of the great toe.
77.	Extensor brevis,	extends the second joint of the great toe.
80.	Adductor,	pulls the great toe toward the rest.
81.	Abductor,	pulls the great toe from the rest.

The LITTLE TOE has two muscles.
Muscles. Uses.

- Cafe W 84. Flexor minimi digiti, bends the first joint of the little toe.
82. Abductor minimi digiti, } pulls the little toe outward.

The GREAT and LITTLE TOE have one common muscle, called

- Cafe W 85. Transversales, which brings all the toes close to one another.

A great many more muscles might have here been added; however this number will give the reader a pretty clear idea of their uses; but if he wants to enquire farther, let him read Douglas's excellent treatise of the Muscles, where he will find not one sentence taken on the credit of another, but every muscle accurately described from repeated dissections.

ANGIOLOGY: or, the Doctrine of the BLOOD-VESSELS.

SECT. I.

Of the Arteries.

AN artery is a canal of a conic figure, oblique, crooked, and divided into several branches; smooth on the inside, and without valves, except in the heart. The branches, rising therefrom, spring at acute angles toward their extremities, and are seldom straight, as the intercostals, or obtuse, as the umbilical vessels of a foetus.

The PULMONARY ARTERY rises out of the right Cases A K 7 ventricle of the heart, and is divided into RIGHT and C 5 E 6. LEFT BRANCHES, which are afterward distributed thro' the whole substance of the lungs, into an infinite number of small ramifications. See page 48.

Cases A E K 13 I 15 Y 1. The AORTA, or GREAT ARTERY, like the pulmonary artery, rises by one branch from the left ventricle of the heart, and gives origin to two small arteries, that go out near the two sides of the pulmonary artery, which having first surrounded, they afterward run upon the base of the heart, in form of a crown or garland, from whence they are called CORONARIES; and then they pursue the superficial traces of the union of the two ventricles, from the base to the point of the heart.

Cases A 19 E x. The trunk, afterward being bent like an arch, sends out THREE * ASCENDING BRANCHES. See A 14, 15, 16, E I C N 2 a b c. p. 48.

Cases E 23 I 16 Y 3. From whence arise the RIGHT and LEFT CAROTIDES; the former generally from the trunk of the subclavian on the same side, but the latter immediately from the aorta. These ascend each side of the wind-pipe, between it and the internal jugular vein, then divide into two large branches, called external and internal carotides. The EXTERNAL runs insensibly outward, between the external angle of the lower jaw, and the parotide gland, and gives branches to the larynx, pharynx, muscles of the tongue-bone, jaws, tongue, lips, nose, eyes, ears, temples, and to all the external parts of the head. The INTERNAL runs up to, and enters the lower orifice of the great canal of the rocky protuberance of the temple-bone, making

* Many divide the great artery into ascending and descending trunks, like the vena cava. But this artery is found otherwise in a man; for after it has risen by one trunk, about two fingers breadth, it bends like an arch, and descends thro' the chest and belly; which, from the base thereof, till it bends, takes up about seven fingers breadth, and is called, from the place of its inflexion toward the lower parts, the descending trunk, whence all the arteries of the lower parts take their origin. But, from the superior part of this arch in a man, there commonly ascend three remarkable branches; the right of which is divided, at one time nearer, and at another time further from the trunk, into the subclavian and right carotide, the middle constitutes the left carotide, and the third makes up the left subclavian. About four years ago, I found four ascending branches in a woman, the two extreme ones of which constituted both subclavians, and the two middle both carotides. But seldom, if ever, are found two ascending branches in a man, much less one; wherefore the aorta cannot be divided into an ascending and descending trunk.

afterward several **CONTORTIONS**, or crooked directions; **Cafe Y 10.** having left this canal to enter the skull, it sends off one branch to the orbit of the eye, another thro' the optic hole which communicates with the external carotide. The **INTERNAL CAROTIDE** runs next **Cafe Y 11.** under the base of the brain to the side of the infundibulum, and there divides into two principal branches, one anterior and the other posterior. The **ANTERIOR** **Cafe C 8.** runs forward under the brain, accompanies the optic nerve, and divides into two or three branches; the **Cases** posterior **COMMUNICATES**, with the **VERTEBRAL C 11 Y 14.** **ARTERY**, then **DIVIDES** into **SEVERAL BRANCHES**, **Cafe C 9.---Cases C Y 15.** which run between the superficial circumvolutions of the brain.

The two **SUBCLAVIAN ARTERIES**, so called from **Cases C E** their situation under, or near the clavicles, or collar **25 I 17 Y 2.** bones, are one on each side; the right longer, larger, and higher than the left, arises from the arch of the aorta, and sends off branches to the thymus, wind-pipe, mediastinum, heart-purse, breasts, neck, &c. likewise two remarkable branches that go by the name of **VERTEBRAL ARTERIES**, which run up thro' **Cases C 27** the holes * in the transverse processes of the bones **E 24 I 18 E** of the neck, and in their passage send off branches **Y 4.** to the adjacent parts. In passing thro' the holes of the second and first joints they **BEND**, and **ACCOM-** **Cases I E** **MODATE** themselves to the obliquity of their passage **Y 12.** into the skull; which, having entered, send off branches to the medulla oblongata, corpora olivaria, and pyramidalia, form the plexus choroides, see p. 66. and give rise to the **SPINAL ARTERIES**, which run down the **Cafe I F.**

* Many are of opinion that the vertebral arteries ascend the skull thro' the holes in transverse processes of the cervical vertebræ; and thus they think that these arteries pass thro' the holes of all the cervical vertebræ. But if they will take the trouble of observing these vessels, when injected, they'll find these arteries generally enter at the sixth hole; the veins indeed come out at the seventh hole. This seems to be done for this end, lest if the artery and vein should pass thro' one and the same hole, while the artery is dilated, the vein might be compressed, and so hinder the progress of the blood in this last. Likewise for this reason the arteries and veins in the skull don't pass thro' the same, but different holes.

fore and back-sides of the spinal marrow, and communicate with the intercostal and lumbal arteries, sent to the same part.

The subclavian artery, having left the chest immediately above the first rib, passes under the arm-pit, and there receives the name of the AXILLARY ARTERY, where it sends off FOUR or FIVE branches, which go to the lateral and fore-parts of the chest, and cross the ribs; likewise to the upper, back, and lower parts of the shoulder and arm. The axillary artery afterward changes its name for that of the BRACHIAL ARTERY, which runs down the inside of the arm to the bending thereof, where it divides into two principal branches, called the radial and cubital.

The RADIAL ARTERY descends along the inside of the radius, or spoke-like-bone of the fore-arm, to its extremity, where it runs nearer the skin, for examining more easily and accurately the pulse. It afterward runs to the interstice, between the first bone of the back of the hand and thumb, where it turns toward the hollow of the hand, and sends off a branch to the external part of the thumb, which, having reached the end thereof, communicates by a small branch, that goes to the internal part. This artery hastily runs under the tendons of the flexor, or bending muscles of the fingers, where it joins the arch of the cubital artery.

The CUBITAL ARTERY descends along the ulna, or ell-bone, to its extremity, and sends branches to the wrist and back of the hand, which communicate with the radial artery, and form an irregular arch, from whence branches are detached to the external muscles and lateral parts of the fingers. The cubital, having afterward got a little beyond the internal annular ligament of the wrist, forms an arch, from which arise three or four branches; the first generally goes to the inner and back part of the little finger; the other three run in the interstice of the bones of the hand, near the heads of which each of them is divided into two branches, which pass along the two internal lateral parts of each finger, from the fore-side of the little,

little, to the hind-side of the fore-finger, and at the ends of these fingers, these arteries communicate and unite with each other.

The DESCENDING TRUNK of the aorta, which Cases A 18 is larger in a female than a male, passes thro' the D 4 E 14 I chest and belly to the sacred bone; from it immediately 20 Y 21 C below the left subclavian artery, arises the DUCTUS N 2, 2.

ARTERIOSUS, or a canal, which is only to be found in the foetus and very young children. In adults, this canal, being shrunk and closed, appears to be a kind of ligament, adhering by one end to the aorta, and by the other to the pulmonary artery. The superior part of the descending artery gives off the BRON- Case M N 10.

CHIAL ARTERIES, which sometimes arise by two branches, and go to each lung, and sometimes by one common trunk, that afterward divides and accompanies the branches of the air-vessels. It next sends off the OESOPHAGÆÆ, or those branches which are distributed upon the gullet; and then the INTERCOSTALS *, which run to the intercostal and adjacent muscles along the LOWER EDGE of the ribs, all the way to the Case Y 22. breast bone or near it. The aorta, immediately under

the midriff, sends out the CÆLIAC ARTERY, which Cases C 2 divides into two branches, and supplies the midriff, Y 23. stomach, liver, gall-bladder, spleen, pancreas, cawl, the first of the small guts, &c. †. It next sends out the SUPERIOR MESENTERIC ARTERY, which is chiefly Cases C 26 spent upon the mesentery, the small guts, and upon E 5 X 22 that part of the great guts lying on the right side of Y 26.

the belly; then the RENAL, or EMULGENT AR- Cases A 21 TERIES, which are commonly two, the right longer D 6 X 23 than the left, because of the vena cava lying on the Y 28 D N right-side between the aorta and kidney. They com- 2, 25.

monly run horizontally without, dividing to the depressions of the kidneys, where they enter by several branches. See p. 24.

* See in Case C the inferior edges of the ribs in the left side.

† The branches which go to these parts have proper names given them, as the hepatic artery, splenic artery, &c.

Cafe D N I, 2, a. The ARTERIES of the renal glands arise sometimes from the aorta above the renal artery, and send out the adipose arteries which go to the fat of the kidneys, and sometimes they come from the trunk of the cæliac artery. See p. 25.

Cases A 28 E 26 K X 24 Y 29 D N I, 7 D N 2, 16. The SPERMATIC ARTERIES, which are commonly two, and sometimes more *, arise from the aorta a little below the renals, descend along the psoas muscles, pass thro', in men, the tendinous openings of the abdominal muscles in the vagina or sheath of the peritonæum, and are distributed upon the testicles and epididymides. See p. 26. In women they do not go out of the belly, but are distributed upon the ovaries and womb, and communicate with the hypogastric branches, at the jagged extremities of the *Fallopian* tubes. See p. 33, 34.

Cases X 25 Y 30. The INFERIOR MESENTERIC ARTERY rises from the aorta a little below the spermatic artery, and is divided into three or four branches, which are spent upon the great guts. The last of these sends out a con-

Cafe W 16. siderable branch, called the INTERNAL HÆMORRHOIDAL ARTERY, which runs down, and is spent upon the straight gut.

Cases Y 31 D N 2, 40. The LUMBAR ARTERIES rise from the aorta, in five or six pairs, or more; and send branches to the adjacent parts of the midriff, to the intercostal muscles, to the muscles of the loins, belly, &c.

Cafe Y 33. The SACRED ARTERIES, which are sometimes one, two, three, or four, rise from the back part of the aorta at its division, and are spread upon the sacred bone, neighbouring parts of the peritonæum, straight gut, fat, &c. and enter the canal of that bone by its anterior holes, being there distributed toward each side.

The aorta, about the last vertebra, or joint of the loins, terminates into two large branches, called

* I found in a male subject, about two years ago, four spermatic arteries, two on each side, which arose separately from the aorta.

The ILIAC ARTERIES, which again, about two Cafes Y 32 or three inches below their origin, divide into D N 1, 8 D external and internal. The external has no parti- N 2, 42. cular name, but the INTERNAL is termed the hy- Cafes D N 2, pogastric artery, which is distributed upon the bladder, 44 O N 1, 2, straight gut (where it goes by the name of the external 10. hæmorrhoidal) parts of generation, buttocks, &c. The Cafes EXTERNAL ILIAC ARTERY descends along the iliac X 26 Y 34 D muscle, and passes out of the belly under the Fallo- 1, 2, 43 O N pian ligament, sends out the EPIGASTRIC ARTERY, 2, 8---Cafe which runs obliquely upward on the tendon of the Y 36. transverse muscle, toward the hind-part of the straight muscle, then along the inner side of this muscle, and afterward communicates with the inner arteries of the breast. The external iliac sends likewise several other branches to the adjacent parts. After the iliac artery has left the belly, it takes the name of

The CRURAL ARTERY, and sends off three small Cafes B 13, branches; the first goes to the skin and ligament of 14 C 15 W the penis, and to the inguinal glands; the second and 1, 2 X 27 Y third to the pectinal and sartorial muscles, likewise to 38. the adjacent coverings. The crural artery afterward runs down upon the head of the thigh-bone, and gets by a particular turn on the inside of the crural vein, where it sends off three considerable branches; the FIRST, or external, runs along the upper side of the Cafe W 2 thigh; the SECOND, or middle, along the inside of Y 37. the thigh; and the THIRD, or internal, is distributed upon the back part of the thigh. Having sent off these three branches, it runs down the inside of the thigh, giving branches to the adjacent parts, to the hollow of the ham, where it is called POPLITEA, Cafes B 15 which sends branches to the parts about the knee, and X 28 Y 39. then divides into external and internal branches. The Cafes EXTERNAL descends along the out-side of the tibia, B 16 C 17 or shin-bone, to the CONVEX SIDE of the foot, where X 29 Y 40. it makes numerous distributions, and, joining the Cafe B 18. internal artery, forms an arch; likewise sends off several branches upon the foot. The INTERNAL di- Cafes B 17 vides into two branches; the FIRST runs down along C 16 X 30 the inside of the leg, passes behind the inner ancle, Y 42.

Q

commu-

Cases B 19
X 31 Y 41.

communicates with the external branch and passes to the sole of the foot, where it divides into two branches; the first passes under the concave side of the heel bone to the sole of the foot; from thence it runs in a kind of an arch toward the great toe, communicating there with the first branch. The convex side of this branch supplies both sides of the three last toes, and forms small communicating branches at the middle of each toe, as in the hand; the other branch, having reached beyond the sole of the foot, is distributed upon the toes. The SECOND runs down the backside of the leg to the heel bone, where it forms an arch, with the internal branch; from thence it runs above the outer angle, and communicates with the external branch.

An artery is distended by the force of the arterial blood, but when that force ceases, it contracts to its former dimensions. In a live creature it appears full, but in a dead body, tho' it retains its blood, small and almost empty. It resists, when distended, and forcibly drives out the air blown therein; when contracted to its least diameter or breadth, 'tis at rest; its contractive power therefore depends upon the nature of its fibres, with the fulness of the vessels. Nor is there a sensible part in the body, without a small artery, as appears from wounds, the use of microscopes, and injections; and these are continued even to the middle of the bones, where we find both membranes, vessels, and fluids. But these vessels are ramifications or branches of the aorta.

When the blood is drove into the aorta, it is somewhat resisted, by that already contained in the arteries, by the conical figure thereof, their turning and winding, their elasticity, and the weight of surrounding bodies, whether they lie above, or press laterally; and lastly, by the narrowness and smallness of the extremities of the vessels; so that this fluid passes thro' the vessels, by the mere excess of the force given by the heart, above the sum of all their resistances; and therefore it is drove thro' the lungs with

with less force, as meeting there with less resistance *.

Since then the whole mass of blood is drove so forcibly, and is so strongly resisted in its passage thro' a full, conical, flexible, and elastic tube; it follows that the diastole of an artery, which happens the same time the heart contracts, is an unnatural violent motion, while that of the heart is natural; and that this happens every where, the same time in a sound body, appears from the fullness of the vessels; but it is chiefly perceived, where the artery is large, bare, and lies upon some hard part.

While the natural contractive and elastic force of the artery strongly resists this diastole, and the pressure of the adjacent parts assists that resistance, it must follow, that the artery, thus enabled, strongly compresses the blood, which would otherwise be at rest by its contractive power; the blood thereupon must flow in a continued, but starting stream. This motion, thus occasioned, is called the systole of the artery; which is performed the same time with the diastole of the heart; being natural to the artery, and not forced, but assisted by the falling back of the valves of the aorta, and the emptiness and flaccidity of the coronary arteries. These two motions make what is called a pulse, in which, the strength, greatness, fullness, equality, and their contraries are observed by physicians, tho' these are scarce the same in two different healthy persons.

S E C T. II.

Of the Veins.

THE blood, being distributed to all parts of the body, by the pulmonary artery and aorta, returns by the veins, which are of a like figure with

* This shews the vast force of the heart, whether we regard the greatness of the several impediments, by how much it exceeds them, or the quantity of fluids to be moved.

the arteries, but are larger and more numerous, tho' less active, consisting of thinner membranes or coats. They are furnished with valves, much like the finger of a glove in shape, situate about the insertions of the smaller branches into the larger vessels, and commonly double, being joined together in the straight passages or trunks of the larger vessels, at some distance from the heart. These valves are so form'd and fixed to the cavity of the veins, as to admit the blood out of the smaller into the larger vessels, but hinder its regress when the heart is contracted, and bear up the weight of it from pressing back into the smaller vessels. The veins neither contract nor beat, but terminate variously as the arteries; their extremities being either rooted in the absorbing pores of the skin, or those placed in the internal membranes; or by inosculation with the mouths of the arteries; or much after the same manner, as in the penis, clitoris, and spleen; or else in the pulposus substance of the glands.

The principal veins are three, the pulmonary vein, vena cava, and the vena portæ.

Cases A K
10 C 9.

The PULMONARY VEIN rises from the left auricle of the heart, where it first forms a sinus, and then is immediately divided into four, and afterward into innumerable branches thro' the substance of the lungs.

Cases A K
3, 4 E 2, 3.

The VENA CAVA or great vein, goes out of the right auricle of the heart by two large separate trunks, in a direction almost perpendicularly opposite to each other; one running upward called the descending cava, or the vena cava superior; the other downward, which goes by the name of the ascending cava, or the vena cava inferior.

Cases A K
4 E 3.

The SUPERIOR CAVA ascends from the right auricle to the first rib, where it terminates by dividing into large branches called subclavians, as lying behind, and in some measure under the clavicles, or collar-bones.

Cases A 20
C N 2, 10.

The superior cava, as soon as it pierces the heart-purse, sends out a capital branch, called the AZYGIC VEIN, which runs down the right-side of the vertebræ, or joints of the back, and, getting behind the midriff, sometimes communicates with the right emulgent

gent vein, sometimes with the adjacent lumbar vein, and sometimes with the inferior cava. The azygic vein sends out three small branches, which go to the wind-pipe, and accompany the branches of the bronchial artery, likewise two or three small branches called the superior right intercostals. As the azygic vein descends, it sends off the inferior intercostal veins on the right side, which run along the lower edges of the ribs, and perforate the muscles by branches, which go to the posterior and external parts of the chest. The azygic vein sends also most of the intercostal veins on the left side. This vein, having reached below the last rib, detaches a large branch, which is spread upon the muscles of the lower belly, and communicates with the last intercostal veins.

The superior cava likewise sends out, between the place where it leaves the heart-purse and its division, several small branches, which go to the mediastinum, heart-purse, the thymus, wind-pipe, breasts, and midriff.

The TWO SUBCLAVIAN VEINS run toward each side, and terminate as they go out of the chest between the first rib and the collar bone. The left subclavian is longer than the right, because the trunk of the vena cava lies not in the middle of the chest, but toward the right side. This trunk gives off branches, answering those that come from the superior cava on the right side, which go to the mediastinum, heart-purse, thymus, wind-pipe, breasts, and midriff.

Each subclavian vein sends out four capital branches, the external and internal jugulars, the vertebral and axillary veins.

The EXTERNAL JUGULAR ascends commonly by one branch to the superior part of the neck, where it divides into two; ONE of which goes to the throat and face, and the OTHER to the temples and hind-head.

The INTERNAL JUGULAR ascends the neck, giving branches to the wind-pipe, gullet, muscles of the tongue-bone, tongue, and adjacent parts, terminates in the JUGULAR BAG, and returns the blood from the latera l canal of the dura mater.

Cafes

A 26 C 29 E 21
N 30 W 33 X 18
Cafes A 27 E 30
31 X 19.--Cafes
A 28 E 32, 33
X 20.

Cafes A 29
E 22 N 29
W 36, 37
X 13.--Cafe
I N 2, 9.

The

The VERTEBRAL VEIN, accompanying the artery of the same name thro' the holes in the transverse processes of the joints of the neck, communicates with the veins in the hind-head, and with the lateral * and small canals of the dura mater.

Cases A 1

B 2 C X 5

K 25 W 4.

The AXILLARY VEIN, which is a continuation of the subclavian, sends out, from the place where it leaves the chest, to the arm-pit, several branches, which are spread upon the breasts, shoulder, and other adjacent parts. This vein having reached the axilla, or arm-pit, from whence it takes its name, sends out a considerable branch called the cephalic vein, and afterwards runs along the arm by the name of the basilic vein.

Cases A 2 C

X 8 W 6.

Cafe C X 12.

The CEPHALIC VEIN, having reached a little below the external knob of the arm, sends off a BRANCH, which communicates with some branches of the basilic vein. The cephalic again, when come pretty near the bending of the arm, is divided into

Cases C X 11

W z.

external and internal branches. The EXTERNAL runs along the radius, or smallest bone of the fore-arm, is afterward distributed like the radial, or external artery, upon the back of the hand and thumb, and sends off a branch, which communicates with a small one from the basilic, and makes the vein called SALVATELLA †.

Cases C 13

W 12.

Cases C W

X m.

Cases C X

10 W 11.

The INTERNAL CEPHALIC runs toward the middle of the fold of the arm, where it joins a short branch of the basilic, and makes the MEDIANA, or MIDDLE VEIN, which afterward divides into external and internal branches; the EXTERNAL runs between the thumb and fore-finger, and the INTERNAL between the ring and middle finger.

Cases C X 9

W 7.

The BASILIC VEIN sends under the head of the arm-bone a large branch, which passes transversely

* This communication is not always to be met with, because the canals, behind the condyloide apophyses of the occipital bone, are often shut up, or grown together.

† The ancients used to open this vein in diseases of the head, in continual and intermitting fevers; but the moderns do not approve of this particular practice, since the knowledge of the circulation of the blood, because there is no difference whether one is blooded in the cephalic, middle, or basilic vein.

round the neck of the bone, and communicates with several other branches. The basilic vein likewise sends a BRANCH or TWO, which run down the inside of the arm. Below the neck of the arm-bone the same vein sends out a CONSIDERABLE BRANCH, which runs down the inside of the humeral artery, and furnishes the neighbouring muscles on both sides. The basilic vein afterward continues its course, and sends several branches, which are distributed upon the arm, hand, and fingers, which, to mention and give them names, would take up too much time, and perhaps confuse some; I shall therefore refer you to Cases C W X, where they are beautifully represented and ramified. Case W 8.

The INFERIOR CAVA, OR ASCENDING TRUNK, with the *Eustachian* valve *, runs down about a quarter of an inch within the heart-purse, pierces that membrane and the tendinous part of the midriff, and sends branches, which are spread upon its lower side. It afterward sends out THREE LARGE BRANCHES, which are ramified thro' the liver, see p. 24; likewise some other small branches, immediately before or after it goes out of the liver, which, as some imagine, answer the branches of the hepatic artery, as the large branches do those of the vena portæ †. The Cases A K 3 E 2. C 4 D N 2 45.

* *Eustachius* gives it only the denomination of a membrane, curiously placed over the hole of the ascending cava from the liver; as soon as this degenerates into the right auricle, it possesses its anterior half, and then forms a reticle; however, says nothing of its use. *Lanciscus* calls this membrane a valve, which he thinks hinders the blood, descending from the jugulars thro' the superior cava, from pushing too violently against the blood ascending thro' the inferior cava. *Winslow* terms it *Eustachius's* reticular valve; also observes, that it is superiorly concave, and inferiorly convex; he shews, that in finding it you must cut the posterior, and not the anterior part of the cava; also takes notice, that it is often wanting in adults, where the oval hole is shut, but is plainly visible in infants, especially where the oval hole is open, when put into a vessel full of water. He not only assigns the same use to this valve with *Lanciscus*, but shews in a fœtus (where it is most visible) that it hinders the blood from returning out of the right auricle, or superior vena cava, into the inferior cava.

† The vena cava, in passing by the liver in a fœtus, sends off the ductus venosus, which communicates with the sinus of the vena portæ, and in adults is changed into a flat ligament.

inferior

Cases A 22 inferior cava next sends off the RIGHT and LEFT
D N 1, 11 N RENAL or EMULGENT VEINS, see p. 24, which
2, 26.--b b. accompany the renal arteries, and send out the CAP-
SULARY VEINS, that go to the deputy kidneys, see
p. 25, and the adipose veins which go to the fat co-
verings of the kidneys; they afterward run into the
cavity of the kidneys, and are distributed thro' their

Cafe L 11. substance by NUMEROUS RAMIFICATIONS. A little
Cases A 29 below the emulgents arise the SPERMATIC VEINS;
E 27 D N 2 the right from the vena cava, and the left from the
17. left emulgent vein. These accompany the spermatic
arteries. See p. 23, 26. Below the spermatics arise

Cafe D N 2, from the vena cava, in several pairs, the LUMBAL
46. VEINS, which are spent upon the muscles of the loins,
and on one side communicate by the transverse branches,
with those of the other, and likewise with one another
by longitudinal branches.

The inferior having reached the first vertebra, or
joint of the loins, runs behind the right iliac artery,
Cases X 30 and there divides into two branches, called the RIGHT
D N 2, 47. and LEFT ILIAC VEINS. From this division goes
Cafe X 2. out the SACRED VEIN, which accompanies the artery
of the same name. Each iliac vein, like the artery,
is divided into external and internal.

Cafe X 30 The EXTERNAL ILIAC, before it goes out of the
D N 2, 48. belly, sends off a small branch, which runs along the
superior edge of the haunch-bone; likewise the epi-
gastric vein, which, accompanying the epigastric artery,
ascends along the inside of the straight muscle of the
lower belly, and unites with the ramifications of the
mammary veins; lastly, several other branches, that
are distributed upon other adjacent parts. This vein,
as soon as it comes from under the *Fallopian* ligament,
and makes its appearance upon the thigh, loses the
name of the iliac, and goes under that of the crural
vein.

Cafe D N 2, The INTERNAL ILIAC, or HYPOGASTRIC VEIN,
50. runs under the artery of the same name, and sends branches
to the straight gut, called the external hæmorrhoidal
veins; likewise to the bladder, parts of generation, but-
tocks, and neighbouring muscles.

The

The CRURAL VEIN, after coming out of the belly, Cafes CX 18 on the inside of the crural artery, sends several small W 3. branches to the inguinal glands, parts of generation, and some adjacent muscles. About an inch below the place where it leaves the belly, it sends off the SA- Cafes CX 19 PHÆNA, which is a large vein, running along the in- W 4. side of the thigh and leg, to the fore-part of the inner ancle, and distributed upon the foot. The crural vein, having sent off branches to the external and internal parts of the thigh, descends till it comes near the ham, where it takes the name of POPLITÆA, Cafes C W which runs down from thence to the heel. This X m. vein likewise sends off two branches, called EXTER- Cafes C X NAL and INTERNAL, which are divided and distri- 22, 21, W buted upon the leg, foot, and toes. 10, 11.

The VENA PORTÆ, so called from its situation Cafes C 5 between the eminences on the concave or hollow side X 20. of the liver, may be consider'd as two large veins, whose trunks unite, and from each of which the branches go out in contrary directions. The SUPERIOR of these trunks adheres to, and is ramified in the liver, its branches accompanying the distribution of the hepatic artery. See p. 20, 21. The INFERIOR BRANCH, having reached the head of the pancreas or sweet-bread, terminates in three large branches, which are distributed, by numerous ramifications, upon the stomach, intestines, pancreas, spleen, mesentery, and cawl. The inferior branch, before the formation of these three branches, sends off several small branches to the gall-bladder, liver, stomach, and the first of the small guts.

The MESENTERIC VEIN, or first capital branch Cafes C 23 of the inferior trunk, having sent some ramifications K n X 19. to the stomach, cawl, mesentery, duodenum, or first small gut, and other adjacent parts, divides into two or three branches; afterward into an infinite number of small ones, which are distributed upon the mesentery, jejunum, ilium, or second and third small guts, and upon the cæcum and colon, or the first and second great guts.

The SPLENIC VEIN, or second capital branch of Cafes C 22 the inferior trunk, runs from the right to the left un- K b X 17.

der the duodenum, and then along the lower side of the pancreas. In this cause it gives branches to every part of the stomach, pancreas, cawl, and colon. The splenic vein reaches the fissure of the spleen, which it passes thro' its whole length by several small branches, almost like the splenic artery. The posterior of these branches sends branches, which go by the name of *vasa brevia*, or short vessels, and communicate with those round the upper orifice, and left extremity of the stomach.

Case W 17 a. The INTERNAL HEMORRHOIDAL VEIN, or the third and last great branch of the inferior trunk, which generally comes from the beginning of the splenic vein, sends first a branch to the duodenum, and is afterward divided into two, one superior, the other inferior. The superior runs along the upper arch of the colon, and the inferior runs down the left side of the colon, and upon the last great gut to its extremity *.

NEUROLOGY : or the Doctrine of the NERVES.

NERVES are white, firm, strong cords, subservient to sense, motion, and nutrition, which arise from the cerebrum, cerebellum, and spinal marrow, and are spread over every part of the body by filaments and ramifications.

* The length of this hemorrhoidal vein and its progress under the intestines render it liable to be compressed, and the returning blood retarded; whence its branches on the last great gut and its extremity are distended with blood, and cause tumours called the hæmorrhoides; which disorders are more incident, not only because the branches of the hæmorrhoidal vein, like the rest of the *vena portæ*, are without valves, and the blood has an ascending progress in them, likewise the long trunk is not only exposed to the compressions of the intestines in both sexes; but particularly the womb in women, during the time of gestation, especially near the birth, so compresses this trunk, that it is no wonder we find the fair sex more afflicted with the hæmorrhoides at that time than any other. The iliac veins are also exposed to the like incumbrance in women with child, whence the veins of the thighs and legs grow varicose or knotty, and often swell.

The

The nerves go in as straight a direction to the parts they serve, as the places over which they are to pass, and their safety from external injuries will allow; likewise send their branches at more acute angles than the blood-vessels. The nerves, which arise separate, and afterward joined, often increase in magnitude, and form knotty oval bodies, called ganglions *.

Tho' the nerves, if all joined together, would scarce make a rope of an inch diameter, yet they are allowed to be the chief instruments of sense and motion; but hot disputes have arose concerning the manner of their acting. Some contend that they act only as so many solid, tense, vibrating strings, while others have argued for their effects being produced by the liquids contained and moved in them; about the nature of which again there has been a great variety of opinions. The former of the nervous fibres, being solid, seems liable to so many objections, drawn from the analogy of the general mechanism of the other parts of the body, and from the particular unsuitness of the nerves to exercise their office in such a manner, as must be supposed by the favourers of this hypothesis, that many are rather inclined to think the nerves, vessels containing a fluid, sent them from the brain in an equal constant stream, and can serve to solve all the phænomena commonly observed either in muscular motions or sensations. If we consider, first, that the whole marrow, being vascular, is employed and spent in the supply and composition of the small nervous fibres, and that they take their origin from it. 2. That the cerebrum or cerebellum, when compressed, divided, putrified or corroded, every action (before performed by the nerves) rising from thence, is presently stopped, altho' the nerves remain in the same condition, and unhurt, in

* The uses, for which these oval bodies are said to be designed, are only conjectures, without foundation; therefore I shall not attempt to explain their office of acting, like so many hearts in assisting to propel their fluids, nor shew the necessity of such fluids collected in large quantities at particular times in these reservoirs, nor the preparation they undergo there for fitting them to perform the offices assigned them; but shall acknowledge my ignorance of the functions they perform. *Monro Anat. Treat. Nerv. p. 4, 5.*

respect of their membranes. 3. That the nerves are loose, suspended, curved, and winding obliquely backward, yet most readily perform their office in the actions of sense and motion. And 4. That being pressed or tied together, tho' they remain intire, the person loses the faculties of sense and motion in the parts that lie betwixt the ligature and the extremities, or those to which the said nerves are directed; the communication being lost between the place of the ligature and the cerebrum and cerebellum, we must conclude that the fibres of the nerves, at their origin in the marrow, receive and transmit this humour to every point of the whole body in distinct vessels; and by this means perfectly discharge and perform their office.

The vessels in the cortical part of the brain, which are chiefly arteries, and consequently immensely thicker than the last lateral excretory ducts derived from them, teach us how very minute these nervous tubes must be; but the great bulk of the brain, compared with the smallness of every fibre, demonstrates their number beyond the bounds of imagination; besides, the great quantity of humours, constantly and forcibly drove hither, implies, that these small canals must always be open, kept full; and in constant action; yet we do not suppose the velocity of this liquid thro' the nerves to be violent; for the number, smallness, curvature, and texture of the arteries, as well as the number, minuteness, and winding course of the nerves with their hardness, convince us that its motion, tho' constant, must be equable and gentle. No wonder then that the eye cannot perceive the motion of this liquor, or that it is not to be exhibited by ligatures, wounds, punctures, blow-pipes, or injections; or that the cavities of the nervous fibres should be invisible; for if we consider the nature of the vessels and humour, these things are not to be expected. They then, who deny the cavities of vessels, because too small to be visible, and too fine to be discovered by art, must be ignorant of the rise, progress, operations and excretions in human bodies, and the structure of insects; nor can they have observed what manifestly happens in plants.

But

But to say no more concerning this long undecided question; I shall imitate Mr. *Monro*, in assuming the following facts, allowed to be true by all parties, and on these endeavour to found the solutions of any phænomena, mentioned in describing the particular nerves.

1. Motion and sense depend on the nerves.

2. When the origin or coats of the nerves are vi-
tiated, either convulsion, or palsy of the muscles ensue.

3. Sensations are pleasant, while the nerves are gently affected; but, whenever a force, applied to them, goes beyond this, and threatens a solution of union, it creates that uneasy sensation, denominated pain.

The BRAIN has ten pair of nerves.

The FIRST PAIR rise from the corpora striata, see Cases E 5 p. 66. near where the carotide arteries enter, and R 20 K 4 in their course, under the fore-lobes of the brain, I I N 2, 11. become larger, till they reach the sieve-like-bone, into the holes of which their small filaments insinuate themselves; being here joined by a branch of the fifth pair, they are spread upon the membrane of the nose *.

2. The SECOND rise single from their beds, Cases E 6 K and, after a long curve, turn under the brain, unite 5 N 2 R 21 above the fore-part of the sella turcica, afterward divide; I N 2, 12. each, running obliquely forward and outward, passes out at its proper hole in the sphenoid or wedge bone, enters the globe of the eye, and forms the retina.

3. The THIRD rise from the anterior edge of the Cases E 7 annular process, and passing out at the lacerated hole, N 3 I N 2, 13. each divides into four or five branches, which are spent

* The olfactory nerves are less sensible in some than in others; thus the same bodies may make very different impressions; hence smells, which are not sensible to some, excite in others surprising effects. We see, for example, that women, who are troubled with hysterics, come sooner to themselves by the force of certain disagreeable and very penetrating odours; whereas agreeable ones increase their diseases; for strong odours shake the nerves that communicate with the olfactory, and make the nervous juice every where flow equally and plentifully; because of this inequality of juice that gives action to the whole body, one part will not carry it over the other; hence there will be no convulsion; but agreeable odours will be somniferous; thus they stop a little the run of the nervous juice, and must consequently produce an effect opposite to that of strong smells, if it be not perhaps that they are somniferous enough to extinguish action every where, and it is for this reason that opium succeeds in these maladies.

upon

upon those muscles that pull up the eye-lids and eye, pull down the eye, pull the eye toward the nose and obliquely upward.

Case E 8 N 4. The **FOURTH** rise from the base of the testes, and 4 I N 2, 14. are spent on the superior oblique muscles of the eye, to which muscles the rotatory motions of the eyes, and their advance forward in starting and fury, are chiefly owing; hence called the **PATHETIC NERVE**.

Cases E 9 I 5. The **FIFTH** rise from the annular process; and, N 5 R 24 after piercing the dura mater, are divided into three I N 2, 15. branches.

Case I h. The **FIRST BRANCH**, when entering the orbit, sends off a small twig or two to assist in forming the intercostal nerve; then this nerve is distributed upon the lachrymal gland, fat, membranes, muscles, and coverings of the eye-lids, while it sends off a large branch thro' the anterior internal hole of the orbit, to join the olfactory nerve, and to be lost in the nasal membrane; and a second branch passes thro' the superciliary hole, to supply the muscles and coverings of the forehead *.

Case I i. The **SECOND BRANCH** passes thro' the round hole of the sphenoid bone, and immediately gives nerves to the fat under the temporal muscle, to the palate, sphenoidal sinus, and nostrils. The remaining branch, insinuating itself into the canal on the top of the large cavity of the upper jaw, to which cavity and the teeth of this jaw, gives small twigs; then comes out at the external hole of the orbit, and is spent on the orbicular muscle of the eye-lids, on the nose and upper lip, where some branches of the seventh pair unite with the twigs of this.

Case I k. The **THIRD** goes out at the oval hole of the sphenoid bone, and, dividing into several branches, is distributed

* Hence we may find the part affected in the megrim, when the globe of the eye and forehead are racked, and a violent heat felt within the nose. Hence we may also know the reason why the muscles of respiration are so much affected in applying any acrid irritating substance to the nasal membrane, as to produce that violent convulsive motion, sneezing. *Monro Anat. Treat. Nerv. p. 12.*

upon the several muscles of the lower-jaw, tongue, and tongue-bone; the sublingual, maxillary, and parotid glands, external ear, where it joins the hard branch of the seventh pair, and to the substance of the tongue, where it is joined with the ninth pair. The last ramification of this branch enters the canal of the lower jaw, furnishes there the teeth, comes out at the chin, on which and the lower lip it is spent, and is here again joined to the seventh pair *.

6. The SIXTH rise from the fore-part of the pyramidal bodies, and in their passage send off a small reflected branch, which, joined with one or two from the first branch of the fifth pair, form the beginning of the intercostal nerve; then this pair pass thro' the lacerated hole, and are spent upon the abductor muscle of the eye.

7. The SEVENTH, rising from the root of the annular process, and, entering the internal auditory passage, divide into two branches; one of which, losing its coats, is called the PORTIO MOLLIS, or soft branch; the other the PORTIO DURA, or hard branch. The former enters the hole in the rocky bone, goes to the

* From what has been said of the fifth pair and of the nerves in general, some account of the phenomena, which happen to the parts they serve, may be made from the communication between the fifth and seventh pair; by means of the chord of the drum and other twigs, we may see how the sound of vibrating bodies, held between the teeth, is sensible to us, when another cannot hear it; or why, in a violent tooth-ach, the side of the head is also pained, and sometimes the muscles of the face are convulsed, and how both pain and convulsion cease upon pulling out the tooth affected, or destroying the nerve. Hence also we know why in a quinsy, the patients often complain of a sharp pain in their ear or teeth, especially when they swallow. From the distribution of these nerves we also know, the reason of a person's complaining of a gnawing pain, deep-seated in the bones of the face, his eyelids, nose, and upper-lip being much swelled, and of the tears trickling down in plenty, when the lower teeth ach, and the spittle flows in great quantities. Hence we have some foundation for the cure of the tooth-ach, by strongly compressing the chin, applying blisters behind the ears, or burning behind, or on the ear. Among many instances of the good effect of the actual cautery in such a case, I shall give a remarkable one. J. M. was seized with the tooth-ach, a convulsion of the whole side of the face followed, whenever the pain became acute, or he attempted to speak, after he had undergone bleeding, purging, blistering, salivations, setons, &c. without any benefit, was cured by applying a small cauterizing iron to the anti-helix.

Monro Anat. Treat. Nerv. p. 14, 15.

labyrinth

labyrinth by several small holes, is expanded on all its parts, and forms the chief part of the organ of hearing. See p. 81, 82.

But the hard branch, in passing over the *Fallopian* aqueduct, returns one or more small branches from the anterior surface of the rocky process into the cavity of the skull, which pass under the dura mater; and another, which, with a branch of the fifth pair, make the chord of the drum, likewise several lesser branches to the muscles and other parts of the drum. The remaining part is spent on the external ear, pericranium, muscles of the tongue-bone, lips, eye-lids, and parotid gland.

Cases E 12
N 8 R 26
I N 2, 18.
Cases N 11
R 27.

8. The EIGHTH rise from the lateral base of the olivarius bodies; then running thro' the common hole of the temporal and occipital bones, there WILLIS's ACCESSORY NERVE joins them, which, taking its origin from the tenth of the head, the first, and often the second of the neck, ascends within the dura mater to pass thro' the just mentioned hole with the eighth pair; it again separates from the eighth, and passes thro' the sterno-mastoideus, which it supplies with nerves to be lost in the trapezial and rhomboid muscles of the shoulder-bone, having often a conjunction with the second cervical in its passage.

The eighth pair run straight down the neck near the carotid artery, giving several branches to the larynx and pharynx. When the chief trunk of this nerve enters the chest, it splits into two; the anterior branch serves the heart-purse, sends twigs to join with others of the intercostal that go to the heart, and then on the right side it turns round the subclavian artery, and that of the left side round the great curvature of the aorta, for ascending the side of the gullet, and being lost in the larynx. The posterior branches, passing behind the two great branches of the wind-pipe, give the lungs many filaments; then that of the left side, after sending some branches to join the right side one, runs down the fore-part of the gullet, and is lost in the stomach; while the right one, separating and rejoining once or twice, keeps its

course

course behind the gullet along to the stomach, which it supplies, and also sends a large branch to join in the ganglion of the intercostal, immediately above the cæliac artery.

9. The NINTH seem to rise from the inferior part of the pyramidal bodies, afterward make their exit thro' their proper holes in the occipital or hind-head bone; and, having sent some nerves to join with others from the first and second cervical, to serve the thyroid gland, the sterno-hyoid and sterno-thyroid muscles, are lost in the muscles and substance of the tongue. Cases E 13
N 9 R 28
I N 2, 19.

10. That PAIR, which Willis calls the tenth, should rather be reckoned the FIRST of the neck, because they take their rise as the spinal nerves do from the spinal marrow, viz. each branch has its origin from both anterior and posterior lateral parts of the marrow, by a great many distinct filaments, which soon join in a small ganglion; and then, after passing out between the hind-head bone, and first joint of the neck, is wholly spent upon the oblique and extensor muscles of the head, except what goes to the ganglion of the intercostal nerve. Cases N 10
I N 2, 20.

The INTERCOSTAL NERVE, having made its exit from the rocky bone, is united with branches from the eighth, ninth, and tenth pair, and from the first and second cervical to form the largest ganglion of the body; from which the nerve goes out and descends the neck with the carotide artery. Cases A x
I m K 32.
See the right
left side of this

This nerve, in its course down the neck, supplies the flexor, or bending muscles of the head and neck, and joins the nerves of the neck. When the intercostal enters the chest, it again forms a GANGLION, from which, nerves are sent to the wind-pipe and heart; these, designed for the heart, join the branches of the eighth pair; and pass between the two great arteries and auricles to the substance of that muscle. Then the intercostal runs down the side of the joints of the back, having nerves sent to it from between these vertebræ or joints; where the addition is made from the fifth nerve of the back, a branch goes off obliquely forward, which, joined with others from the sixth, seventh, eighth, and ninth, forms the anterior trunk passing thro' its hole in Case K 11.

Case K 19.

the midriff, where it again forms a ganglion above the cæliac artery, into which the eighth pair enter. This

- Case K 43. NERVE sends nerves to the guts, liver, spleen, pancreas, kidneys, and renal glands. The POSTERIOR TRUNK, in its course to the basin, communicates with the last of the back and loins, sends off branches to the kidneys and testicles; and some of its branches join with others from the anterior trunk to form a ganglion, close to the inferior mesenteric artery, for supplying part of the colon and straight gut. The extremity of this nerve furnishes other parts about the basin with nervous twigs*.

Case I F F. The NERVES arising from the SPINAL MARROW 1, 2, 3, 4, 5, are thirty pair. The NECK has seven pair. 6, 7.

The first THREE PAIR give branches to the muscles of the head, neck, and shoulders; but the second pair send a particular branch to the side of the head, parotid gland, and external ear, where it communicates with the head branch of the seventh pair. The third pair send a branch, which, being joined by one from the fourth, forms the phrenic nerve, that runs along the heart-purse, and is spent upon the midriff.

Cases I K 4, 5, 6, 7, W 38. The FOURTH, FIFTH, SIXTH, and SEVENTH PAIR, having given some branches to the head, neck, and shoulders, unite with the first pair of the back, and

Cases I G form a very LARGE PLEXUS or KNOT, which, after K 12. furnishing the neck and upper part of the chest, goes

Cases I 1, 2, to the arm-pit, where it divides into SIX LARGE 3, 4, 5, K 13. BRANCHES, which are distributed upon the arm, hand, and fingers. The FIRST runs down upon that part of the skin which covers the fore-part of the arm and palm of the hand. The SECOND, after supplying some muscles of the arm, is spent upon the coverings of the back of the arm and hand. The THIRD, having furnish'd those muscles which bend the fore-arm, sends a branch

* With a view to the numerous communications of this nerve in the neck, I have often applied blisters from the ears to the clavicles in children, lab'ring under the chin-cough, with very good success. From its distribution, we may learn the reason of the great sympathy of the parts contained there; and why a violent vomiting generally attends the nephritis; why strangulations, belching, cholics, stomach-achs, so often happen from obstructions of the menst'ua; how convulsions may be brought upon the other parts of the body by such obstructions, and by violent irritations of the stomach and guts from other causes; and why vomiting, gripes, and purging are so frequent among children, while their teeth are cutting the gums. *Monro Treat. Anat. p. 23.*

to the back of the hand and fingers. The **FOURTH**, having supplied the muscles that bend the arm and coverings of the elbow, descends and is lost in the back of the hand and some of the fingers. The **FIFTH**, accompanying-Case W 16. the humeral artery to the bending of the elbow, and sending nerves to the muscles lying between the bones of the fore-arm, descends along with the radial or external artery of the fore-arm to the wrist, where it divides and is sent to the back of the hand, thumb, fore, middle, and half of the ring-finger *. The **SIXTH**, or **AXIL-**Case W 14. **LARY NERVE**, runs under the hollow of the arm, and turns outward and backward; likewise divides into several branches, for supplying some of the adjacent muscles about the head of the arm-bone †.

The **BACK** has twelve pair, which, beside the arm Case I 1, 2, branch, run along the sinus in the inferior edge of 3, 4, 5, 6, each rib, and send branches to the pleura, intercostal, 7, 8, 9, 10, pectoral, and abdominal muscles, to the breasts and other 11, 12. parts surrounding the chest.

The **LOINS** have five pair, which send branches not Case I n n n. only to the loins, peritonæum, coverings and muscles of the belly; but their first pair on each side send a twig to the midriff; the second pair, being united with the branches of the first, third, and fourth pair, form the **CRURAL NERVE**, distributed thro' the fore-part of the Case I o. thigh; and thus a branch is composed of the second, third, and fourth pair, which passes thro' the anterior part of the great hole of the share-bone to the scrotum, testes, and adjacent parts ‡. The fourth and fifth pair, with the first,

* The cause of this nerve is sufficiently felt by leaning on the elbow for some time, from the insensibility and pricking pain in the parts upon which it is distributed.

† A palsy and atrophy of the arm may happen from a strong continued pressure on these nerves by crutches, or the like hard substance. By observing the course of these nerves, may easily see that blisters, or nervous medicines, would have a much better effect, if applied along the transverse processes of the cervical vertebræ, or to the arm-pits, than when put between the shoulders or spinal processes, which is the common practice in convulsions or palsies of the superior extremities, where a stimulus is required. *Monro Treat. Anat. Nerv. p. 28, 29.*

‡ When we consider the situation of the kidney on these nerves, the course of the ureter crossing them and others sent to the testicle, the reason will plainly appear, why the trunk cannot be raised in a nephritis without intolerable pain, the thigh loses its sensibility, and is drawn forward; and the testicle often convulsively drawn toward the wings of the abdominal muscles. *Monro Treat. Anat. p. 30.*

second, third, and fourth of the os sacrum, or sacred bone,
 Case I H H. form the ISCHIALIC, or posterior crural nerve, which
 is the largest of the whole body.

This nerve, before it leaves the pelvis or bason, sends
 small branches to the straight gut, bladder, parts of gene-
 ration, and neighbouring muscles; it afterward descends
 along the posterior part of the thigh-bone; between its
 Case I p. two inferior heads, where it divides into two, ONE of
 which goes along the lesser bone of the leg to the upper
 part of the foot, and gives a branch to both sides of each

Case I q. toe. The OTHER descends along the great bone of the
 leg, passes under the inner angle, and is, in like manner,
 distributed upon the under sides of the toes.

Case I r. The OS SACRUM, or sacred bone, has generally
 Case I i, 2, FIVE or SIX PAIR, which pass thro' the anterior holes
 3, 4, 5, 6. of this bone; the superior four, already mentioned, con-
 stitute the ischiatic nerve; the fifth is spent on the parts
 situate in the bason, viz. the straight gut, bladder, parts
 of generation, and neighbouring parts.

ADENOLOGY : or, the Doctrine of the GLANDS,

Taken from HEISTER.

A GLAND is a part of a particular make, con-
 sisting properly of blood-vessels, nerves, and for
 the most part, of an excretory duct, and distin-
 guishable from all other parts of the body by its
 form, consistence, texture, and connection.

Glands are divided into simple, consisting of one
 small body, inclosed in a membrane; and into com-
 pound, consisting of many small ones, wrapped up in
 one common coat.

Some reckon the brain one great gland, but injections
 demonstrate it to be vascular; yet some small glands are
 found in and near the sinuses or canals of the dura mater,
 others

others in the cavities of the frontal or forehead bone. See p. 65, 90.

THE PINEAL and PITUITARY GLANDS are reckoned among the number ; but their use is uncertain. See p. 67.

The glands on the outside of the head are, the parotide, maxillary, sublingual, lingual, labial, palatine, and buccal glands, here and there dispersed along the membrane of the mouth, see p. 90, 91, 92. also the lachrymal gland in the orbit, p. 71. Under the eyelids are the sebaceous glands. The tonsils of the jaws, see p. 92. the mucous glands in the pituitary membrane of the nostrils, and the ceruminous glands in the auditory passage. See p. 81.

In the neck is situate the thyroid gland, resembling a horned moon, see p. 58. likewise several others of a different magnitude, figure, situation, and number. They are commonly supposed to assist the lymphatics.

In the thorax or chest, some glands are external, as the breasts, see p. 44. and some internal, as the thymus, see p. 46. The BRONCHIAL GLANDS come next under consideration, which are pretty remarkable, being situate on the outside in the larger divisions of the wind-pipe and air-vessels of the lungs, of a blackish colour, and as yet of an uncertain use. These glands have been supposed to secrete a liquor, for lubricating and moistening the air-vessels. See p. 58. About the fifth vertebra, or joint of the back, or near it, a remarkable gland, about the bigness of a kidney bean, is often found adering to the gullet, which serves to secrete a liquid for assisting digestion*.

In the abdomen or lower belly, are many glands, among which, some reckon the liver, spleen, kidneys, and testicles; but the same opinion may be formed concerning them, with that of the brain; because we never yet could observe any thing in a natural state, that possessed the habit of, or resembled a gland, but every

* *Heister* found this gland increased in a man to the bigness of a hen's egg, whereby the gullet was so compressed, that nothing could longer enter that way; and *Verheyen*, from the same cause, found the passage of the gullet entirely obstructed.

where

where vascular. Some affirm the spleen to be a glandular body, because tubercles are sometimes found there in morbid bodies; but it has not yet been discovered that the spleen secretes a fluid. If the kidneys of a man, &c. be dissected, either raw or boiled, their whole cortical and interior substance will appear vascular; as for the round bodies, which some say they are made up of, I have not yet had the pleasure of finding. The testicles are by most reckoned vascular. Likewise no glands are to be found in the pleura, pericardium, peritonæum, and vaginal coat, but only morbid tubercles.

Case A 16
K 18 M N
3, 1.

The only glands in the abdomen are the pancreas, see p. 21. renal, see p. 25. MESENTERIC, see p. 22. and the intestinal glands, with those belonging to the stomach. About the lumbar vertebræ or joints, where the receptacle of the chyle is situate, the sacred bone, and the division of the iliac vessels, are several glands of different figure and magnitude, in which numerous lymphatic vessels enter, and from thence discharge themselves into the receptacle of the chyle. In the concave part of the liver, about the entrance of the vena portæ and the neck of the gall-bladder, also near the spleen, at the entrance of its vessels, compound glands are often found about the bigness of a kidney bean, which assist the lymphatics.

The bladder and ureters have often small glands, and some of these glands, having no fixed place, appear here and there; but in the bladder, especially near its neck, they are more conspicuous; however, this rarely happens.

In the genital parts belonging to men are, 1. Cowper's. 2. Littrius's glands. See p. 27. 3. Tyson's odoriferous glands in the prepuce and corona of the penis, yet these in the interior part of the prepuce are more visible than those in the corona of the penis, where it is difficult to distinguish them from the nervous papillæ in that place; and, 4. The prostrate glands, see p. 26.

In the genital parts belonging to women, we may reckon among the glands, 1. Those discovered and described by Morgagni in the nymphæ, which resemble

ble the odoriferous glands in the prepuce of the penis. 2. Some place glands in the urethra of women as well as in that of men. 3. About the orifice of the urethra in the vagina, where the lacunæ appear so large as to receive hogs bristles, subjacent glands are sometimes found.

The glands belonging to the extremities are, 1. The *AX-Cases* A x *ILLARY*, inclosed with fat, situate in the arm-pits, close W 17. to the axillary vessels; and, 2. The *INGUINALS*, placed Cases W 11. above the crural vessels on each side in the groin; which, in several diseases, often swell, are inflamed and turn into abscesses, or sometimes incurable schirrus's; as for their use we know little of it. 3. *Haver's* glands, called from their use, mucous glands; these are chiefly observed in the articulations of the bones, especially in the thigh-bone, where it is received into the acetabulum, and where it joins the tibia. These are the softest of all the glands, and secrete a mucous liquid, found in the articulations of the bones, for lubricating their extremities, that the motions may be performed with greater ease and expedition, and that the joints may be hinder'd from growing together. These glands greatly resemble a certain subtile species of fat, found in the interstices of some muscles, and in the vertebral canal about the spinal marrow; so that it is doubtful, whether this be a true gland, or some loose kind of fat. Several small glands are here and there observed about the blade bone, the flexure of the cubitus, hand, foot, and in other places between the muscles. As for the cutaneous glands, or those belonging to the skin, *Steno* says he observed every pore of the skin to have its gland, from which arises a sudoriferous vessel, terminating on the exterior surface of the skin; and from thence *Verheyen* calls them subcutaneous glands. But how many such glands would there be, if all the pores had their subjacent glands? surely so great a number could not escape the sight. If we carefully separate the skin from the subjacent fat, no glands are to be seen either on the surface of the fat, or on the interior surface of the skin. Some minute particles are found here and there adhering to the small holes of the skin, which seem to have deceived many; but a diligent inspector will easily find that they are not glands. Hence it is evident that there are no subcutaneous glands, that is, such as lie under every pore of the skin, and which are commonly called miliary glands. But in the skin, or on its exterior surface under the scarf-skin, we often observe in several parts of the body small round bodies with a small excretory duct, especially in the eye-lids, nose, ears, areolæ
of

of the nipples, arm-pits, in the skin of the penis and scrotum, about the anus and pudenda of women, &c. which, if they are, as it were, particular bodies, may be reckoned cutaneous and not subcutaneous glands, because none are found under the skin. Concerning which, we observe, 1. That they are not equally numerous, nor of the same magnitude in all; for in some, the nose and eye-lids abound with such corpuscles of a miliary magnitude, and all parts are rough with them, so that from thence they make a remarkable deformity in the face; in some they are very few and small; and in others scarce visible. The skin of the penis and scrotum of some are very full of such corpuscles; but in others we scarce find any or none at all. In the areolæ of the breasts they are seldom found so large as *Morgagni* has delineated them; whence they differ considerably in number, place, and magnitude. 2. It remains yet doubtful, whether these tubercles are true glands, or whether they are not rather excretory ducts, arising from the evanescent arteries of the skin, which, either by the thickness of the scarf-skin, or by the viscidness of the matter contained within them, are obstructed and afterwards expanded into tubercles. Reason also seems to persuade us that these globular particles are not true glands; 1. Because they are not visible in some sound human bodies, or at least cannot be discovered in several places. 2. Because, after stagnation, a viscid matter being squeezed out of them, the whole tubercle disappears, and the part falls; which could not happen if the tubercle was a true gland, that is, a certain peculiar substance, consisting of a congeries of small vessels, inclosed in a proper membrane, altho' something had been expressed from thence. Thus far *Heister*.

The following eight principles, if rightly considered, may serve to explain all the difference that occur in secretions.

1. The motion the blood receives from the heart is very slow in the capillary arteries, which are very distant; thus the viscous parts cannot be propelled in the strainers that are near the extremity of these arteries.

2. The capillary arteries are smaller in one part than in the other; they therefore will receive some substances sooner than others.

3. The strainers, that receive a thick substance, will also receive a more subtil; thus the secretions will never be pure.

4. Some parts of the blood are more subtil than others; thus some will pass thro' those parts where others cannot.

5. There are parts easier to be separated than others; thus a violent motion will separate them, in order to drive them in certain strainers; but a slow motion will not be able to separate them in such a manner, as to make them enter strainers of the same diameter.

6. Strainers that will receive fluids, that have been presented to a vast many others smaller, will be filled with a thick matter; this is the case in the liver.

7. The stay, heat, vicinity of the heart, and evaporation of the aqueous matter will tinge the fluids already filtrated, with divers degrees of colour, acrimony, and thickness.

8. The fluids will be filtrated in a greater quantity, according to the number and bulk of the secretory tubes, and their distances from the heart.

F I N I S.





